MaxNAS

Owner's Guide

October 2008

MicroNet

www.MicroNet.com

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Federal Communications Commission

Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Only use shielded cables, certified to comply with FCC Class B limits, to attach this equipment. Failure to install this equipment as described in this manual could void the user's authority to operate the equipment.

Canadian Department of Communications Compliance: This equipment does not exceed Class B limits per radio noise emissions for digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Conformite aux regiements du Department Canadien de Communications: Cet equipement n'excede pas les limites de Classe B concernaut les bruits des emissions de radio pour le dispositif digital etablies par le Reglement d'Interference de Radio du Departement Canadien de Communications. L'operation de cet equipement dans un quartier residential peut occasionner des parasites inacceptables dans la reception de la radio ou de la television exigeant le proprietaire ou l'operateur de faire routes les necessaires pour corriger cet interference.

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Limitations of Warranty and Liability

MicroNet Technology has tested the hardware described in this manual and reviewed its contents. In no event will MicroNet or its resellers be liable for direct, indirect, incidental, or consequential damage resulting from any defect in the hardware or manual, even if they have been advised of the possibility of such damages. In particular, they shall have no liability for any program or data stored in or used with MicroNet products, including the costs of recovering or reproducing these programs or data.

During the specified warranty period, MicroNet guarantees that the product will perform according to specifications determined by the manufacturer, and will be free of defects. Parts and labor of the received product, and replacement parts and labor are guaranteed during the specified warranty period. The warranty covers defects encountered in normal use of the product, and does not apply when damage occurs due to improper use, abuse, mishandling, accidents, sand, dirt, excessive dust, water damage, or unauthorized service. The product must be packed in its original packing material when shipped, or the warranty will be void. In all cases, proof of purchase must be presented when a warranty claim is being made.

Technical Support Policy

If you have a problem installing your system or suspect it is malfunctioning, please contact the Authorized MicroNet Reseller from whom you purchased the system. If the reseller fails to resolve the problem, call MicroNet's Help Desk for assistance at (310) 320-0772. Please have the model, serial number, date of purchase, and the reseller's name available before calling. If possible, call from a telephone near the system so we can more readily direct you to make any necessary system corrections, should they be required.

Returning Materials

If a reseller or MicroNet Technician finds it necessary to have the system returned for testing or servicing, a Return Materials Authorization (RMA) number will be issued. The RMA number must be placed on the outside of the carton in large, visible letters near the address label. Return the complete system including all cables and software. The system must be packed in the original packing materials and shipped prepaid. MicroNet will repair the system and return it prepaid by similar common carrier and priority. Please record the RMA number and make reference to it when inquiring on the status of the system. A returned unit found to be fault-free will carry a $65.00 charge for service and repackaging.

Welcome From MicroNet Technology

We are pleased that you have chosen the MaxNAS. Our systems are designed for speed, reliability, compatibility, and performance. We think you will find the system easy to install, and a productive addition to your computer system. Please take a moment to register your product online at www.MicroNet.com.

This manual presumes that you are familiar with standard computer operations; this includes copying files, opening documents, clicking with the mouse, and organizing files or folders within other folders. If you are unfamiliar with these operations, please consult the User's Guide that was supplied with your computer system. Your computer dealer and local user's groups are also good sources of information. After you are comfortable with the operation of your computer, continue reading this manual which describes hardware installation and operation.

Your comments assist us in improving and updating our products. Please feel free to share them with us. Please send comments to:

MicroNet Technology
Attn: Customer Service
19260 Van Ness Ave
Torrance, CA 90501
Internet: http://www.MicroNet.com

Chapter 1- Getting Started

Thank you for purchasing The Micronet MaxNAS storage solution. With speed, high capacity, ease of use, and support for numerous applications, MaxNAS is the ideal solution for all of your data storage needs.

Please take advantage of the information contained within this manual to ensure easy setup and configuration. If at any time you require technical assistance, Micronet's Help Desk is available at 310-320-0772 or email us at Support@micronet.com

1. Features and Benefits

MaxNAS is a versatile and powerful storage solution, allowing it to be utilized in several different roles:

- As a shared storage device for multiple PCs, Macs, and UNIX/Linux workstations
- As a central, fault tolerant data server for a home or small business network
- As a central backup station
- As a central hub for print services, media streaming, and unattended downloading

Benefits: • Easy-to-use for non-MIS personnel • SATA (Serial ATA) disk channel interface • Networked Storage on Gigabit Ethernet • Easy to use Graphical User Interface **Data Reliability Features:** • RAID Level 0, 1, 5, 6, Span • Multiple LUN support • RAID Auto Rebuild • Network Backup • Hot Swap/Hot Spare disk support • Disk Roaming	**Networking Features:** • 2x 10/100/1000 auto-sensing Ethernet ports • Ethernet link aggregation with failover and load balancing • iSCSI services concurrent with NAS **Network Services:** • Windows Client Support with Active Directory integration • UNIX/Linux Client Support • Apple OS X Client Support • FTP, Webdisk, Secure Webdisk • DLNA streaming server • Attach and share USB and eSATA devices

2. System Requirements and Compatibility

The MaxNAS is designed for universal compatibility. It features SMB/CIFS, NFS, FTP, iSCSI, USB direct attachment, as well as Webdisk/Secure Webdisk http-based connectivity for host access. This manual will address Windows XP and newer, and Macintosh OS X 10.4 and newer hosts only but the concepts and connectivity features are available to other operating environments as well.

3. Unpacking the MaxNAS

Please unpack your MaxNAS in a static free environment, carefully making sure not to damage or discard any of the packing material. If the RAID subsystem appears damaged, or if any items of the contents listed below are missing or damaged, please contact your dealer or distributor immediately.

In the unlikely event you may need to return the MaxNAS for repair or upgrade, please use the original packing material to ensure safe transport.

4. What's Included

Your MaxNAS comes with the following items:

1 MaxNAS unit
5 Disk Drive Modules
1 Set of drive locking keys
1 MaxNAS Product CD
1 Quick Install Guide
1 power cord
2 Cat5e Gigabit Ethernet cable

5. Choosing a place for your MaxNAS

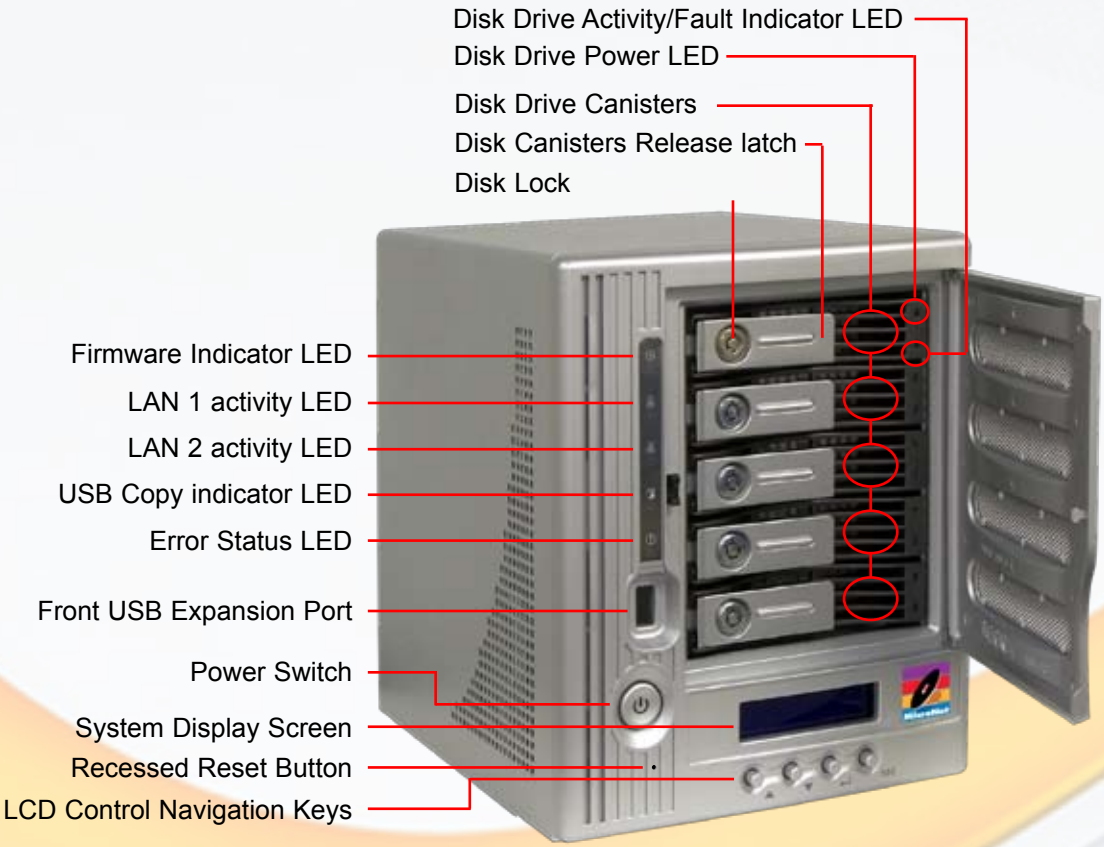
When selecting a place to set up your Disk Array, be sure to follow these guidelines:

- Place on a flat and stable surface capable of supporting at least 25lbs
- Place the Disk Array close enough to a network jack for the Ethernet cable to reach it.
- Use a grounded wall outlet.
- Avoid an electrical outlet controlled by wall switches or automatic timers. Accidental disruption of the power source may wipe out data in the memory of your computer or Disk Array.
- Keep the entire system away from potential sources of electromagnetic interference, such as loudspeakers, cordless telephones, etc.
- Avoid direct sunlight, excessive heat, moisture, or dust.

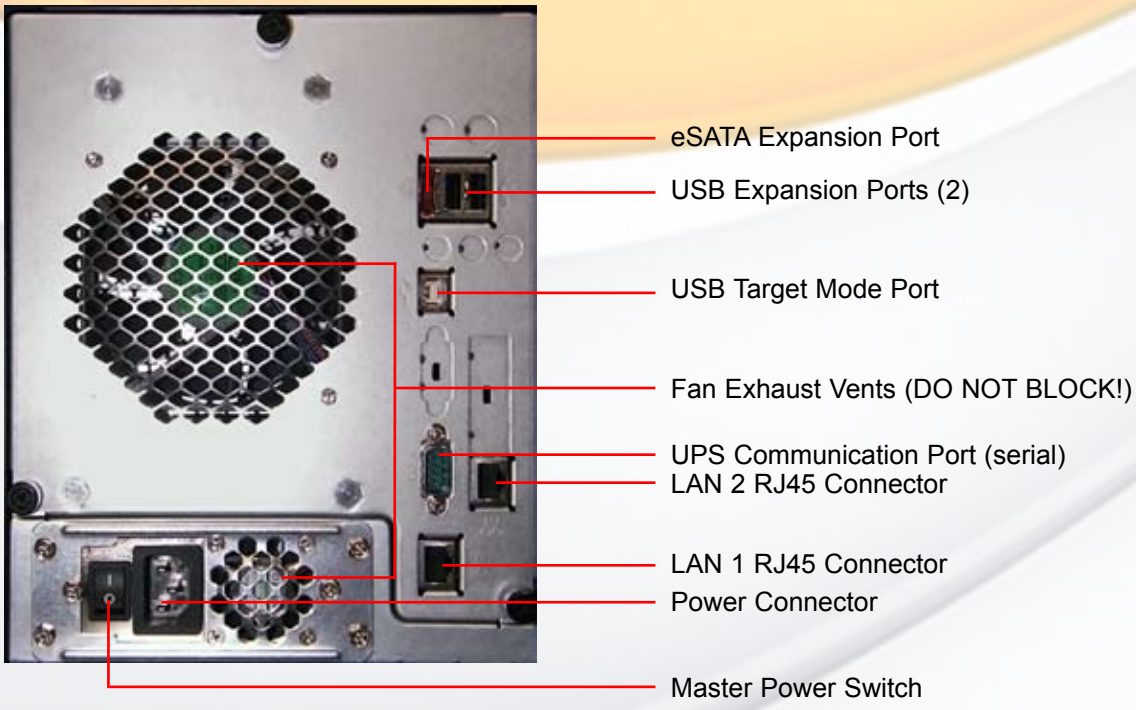
6. The MaxNAS interface components

The following figures illustrate the connector locations for the RAID subsystems.

FRONT VIEW



REAR VIEW



7. Visual and Audible Indicators

The MaxNAS has an LCD panel, LEDs, and a buzzer to inform the user of the overall health and function of the unit. The following chart describes the various conditions indicated:

Indicator	Normal Status	Problem Indication
Firmware LED	Glows amber at boot or firmware update. Dark after.	Dark at boot
LAN1 LED	Blinks green when there is network activity on the LAN 1 port. A steady green glow means there is a link but no activity.	LED does not light up (no link)
LAN2 LED	Blinks green when there is network activity on the LAN 1 port. A steady green glow means there is a link but no activity	LED does not light up (no link)
USB Copy LED	Glows blue during USB copy operation	N/A
System Error LED	Off	Glows red to indicate system fault. Log into the management GUI for further information
Power Button LED	Glows blue on Power Up Blinks blue on eSATA access	LED does not light up on power
Disk drive power LED	Glows blue	LED does not light up
Disk Activity/Fault LED	Off/blinks green during hard drive read and write activity	Blinks red to indicate disk drive error

8. Hot plug Drive Replacement

In the event of a drive failure, the RAID subsystem supports the ability to hot-swap drives without powering down the system. A disk can be disconnected, removed, or replaced with a different disk without taking the system off-line. In a fault tolerant array, the RAID rebuilding will proceed automatically in the background (see chapter 5, "Understanding RAID" for more information.)

A drive failure will illuminate amber the Disk Activity/Fault LED on the affected drive canister. To replace a drive, please follow these steps:

1. Make sure the drive locking mechanism (see page 9, *"The MaxNAS Interface components"*) is in the up-down position (use the included key to turn the mechanism.)
2. Click down on the drive release latch (see page 9, *"The MaxNAS Interface components"*) to release the drive tray.
3. Gently pull out the disk drive tray handle and slide out the drive tray.
4. To replace: Slide in the replacement drive tray with the tray handle open. When the tray is slid all the way into the MaxNAS, push the tray handle closed.

IMPORTANT: NEVER remove a drive tray without replacing it. Operating the RAID with a drive tray missing will disrupt airflow and may cause the MaxNAS to fail.

Chapter 2- Connecting the MaxNAS

1. Connect Your MaxNAS

Place on a flat and stable surface capable of supporting at least 25lbs, and close enough to the available network jack to reach with an Ethernet cable.

Step 1. Remove the disk canisters from the packing material and carefully insert into the MaxNAS.

Step 2. Secure each canister into position and push the latch until it snaps into place.

Step 3. Connect the provided power cord into the universal power socket on the back panel. Plug the other end of the cord into a power socket. Make sure the power switch is in the on position ("-")

Step 1- Insert Canisters

Step 2- Secure Canister Latches

Step 3- Connect Power and turn on switch

Step 4- Connect Network Cable

Step 5- Press Power Key

Step 4. Connect an Ethernet cable from your network to LAN1 (DHCP environment) or LAN2 (static IP) port on the back panel.

Step 5. Press the power button on the front panel. The MaxNAS will boot. The Power indicator light should glow blue, and the LAN LED corresponding to the connected interface will glow or blink green. All the HDD Power LEDs on each HDD tray should glow blue.

IMPORTANT! If Any LED glows red and the system emits a continuous beeping sound, then the system is reporting fault. Refer to Appendix A: Troubleshooting for further information.

2. Accessing System Administration for the first time

The MaxNAS comes pre-configured with the LAN1 Ethernet port set to DHCP (Dynamic Host Configuration Protocol) and the LAN2 Ethernet port set to a static IP address, 192.168.2.100. The current IP addresses are displayed on the LCD panel. The default WINS (Windows Internet Naming Service) for the MaxNAS is "MaxNAS". Included with your MaxNAS is a discovery wizard for Mac and PC, which allows click-and-select simplicity; simply install the wizard software, launch it, and the wizard discovers your MaxNAS for administration.

IMPORTANT! If you are adding a MaxNAS to a network with existing MaxNAS products, please make sure to assign each unit a different name. See Chapter 3, Section 2.3 for more information.

2.1 Wizard Installation and Usage

IMPORTANT! The setup wizard uses TCP port 10000 and UDP ports 11000-11001 For communication. If you are using a software firewall, please make sure to unblock those ports in order for the wizard to get access to the MaxNAS.

2.1.1 Macintosh OS X

The wizard application for Mac OS X is located on your MaxNAS CD in the "wizards" folder. You may launch the wizard directly from the CD, or you can copy it to your Applications directory. Launch the wizard by double clicking the "Setup Wizard" Icon.

Setup Wizard

2.1.2 Microsoft Windows

The wizard installation files for Windows are located on your MaxNAS CD in the "wizards" folder. Install the wizard by double click the file named "setup.exe" and follow the instructions on the screen. Once complete, you may launch the MicroNet setup wizard by clicking the "Setup Wizard" shortcut (by default the shortcut is installed to "Start- All Programs- MicroNet- MicroNet Setup Wizard- Setup Wizard".)

2.1.3 Using the Wizard

When the wizard is launched, it will briefly display a welcome window followed by the main application Interface (Illustrated right) at the Device Discovery Stage. All discovered MicroNet MaxNAS devices will appear in the main discover windows, including the following details:

IP Address	DNS domain
MAC Address	LAN port connected
Gateway	Firmware revision
Netmask	Addressing Mode (DHCP/Static)

To administer a MaxNAS, select the unit desired in the device discovery window click Start Browser to launch the web administration interface. If the MaxNAS is outside your subnet mask and unreachable, click Next to change the IP address assignment.

2.1.3.1 Logging in- Enter the administative login (default is "admin") and password (default is "admin") and click Next.

2.1.3.2 In the Network Configuration screen you may change the hostname, enable/disable DHCP or set static IP addressing. Click "Next" to continue. No changes must be made to continue. For more information regarding Network configuration, please see Chapter 3, Section 3. Click Next to proceed to the Change Password screen or click Exit to end the wizard session.

2.1.3.3 You may change the password by entering a new "New Password" field, and re-enter the password (case sensitive) in the "Confirm Password" field. Click End to conclude the wizard session.

2.2 Launching the IP Storage Administration GUI, DHCP Environment

Windows hosts can access the MaxNAS via WINS. Mac OS X and *nix based workstations may not support WINS and would require your network administrator to provide the newly assigned IP address before accessing the MaxNAS.

2.2.1 Make sure your MaxNAS is connected via LAN1 to a hub or a switch that is connected to the DHCP server

2.2.2 (Windows hosts) Point your browser to "http://MaxNAS"

2.2.3 (Windows UPNP enabled hosts) Windows XP and newer support UPNP discovery. To enable UPNP, navigate to "My Network Places" and select "Show icons for networked UPnP devices." Confirm the operation in the confirmation dialog box. Once UPnP is enable, a Remote UPnP device icon should appear. Double Click the UPnP icon for the MaxNAS, and a browser session will automatically launch.

2.3 Launching the IP Storage Administration GUI, Static IP Environment

2.3.1 Make sure your MaxNAS is connected via LAN2 to a hub or a switch that is connected to your workstation

2.3.2 Configure the IP address of your workstation to 192.168.2.101, subnet mask 255.255.255.0. Refer to your operating system's documentation for more information on this procedure.

2.3.3 Point your browser to "http://192.168.2.100"

Note:
The UPNP Icon for MaxNAS may blink in the explorer windows. This is normal behavior.

2.4 Logging In

The default User ID and password on the MaxNAS are:

UserID: admin
Password: admin

Enter the userID and password, and click the "Login" button. You are now ready to administer and customize your MaxNAS.

3. LCD Operation

The MaxNAS is equipped with an LCD on the front for easy status display and setup. There are four buttons on the front panel to control the LCD functions: Up (▲), Down (▼), Enter (↵) and Escape (ESC) keys. The following table illustrates the keys on the front control panel:

Icon	Function	Description
▲	Up Button	Select the previous configuration settings option.
▼	Down Button	Select the next configuration settings option.
↵	Enter	Enter the selected menu option, sub-menu, or parameter setting.
ESC	Escape	Escape and return to the previous menu.

During normal operation, the LCD will be in Display Mode. The following information will rotate every one-two seconds on the LCD display.

Item	Description
Host Name	Current host name of the system.
WAN	Current WAN IP setting.
LAN	Current LAN IP setting.
Link Aggregation	Current Link Aggregation status
Disk Info	Current status of disk slot has been installed
RAID	Current RAID status.
System Fan	Current system fan status.
CPU Fan	Current CPU fan status
2008/06/16 12:00	Current system time.

3.1 USB Copy

The USB Copy function enables you to copy files stored on USB devices such as USB disks and digital cameras to the MaxNAS with a press of a button. To use USB copy, Plug your USB device into the front USB port, and press the Down Button (▼). The LCD will display

MicroNet MaxNAS
USB Copy?

Press Enter (↵) to initiate the process. All of data on the external disk will be copied into system share named “USBcopy”.

3.2 Management Mode

To enter into front panel management mode, press Enter (↵). An “Enter Password” prompt will show on the LCD. The default LCD password is “0000”. Enter the system password followed by Enter (↵).

Note:
You can also change the admin password using the Web Administration Interface (“System” -> “Administrator Password.”) For more on the Web Administration Interface, see Chapter 3: System Management.

Item	Description
LAN Setting	IP address and netmask of your LAN1 port.
WAN Setting	IP address and netmask of your LAN2 ports.
Link Agg. Setting	Select Load Balance or Failover.
Change Admin Passwd	Change administrator’s password for LCD operation.
Reset to Default	Reset system to factory defaults.
Exit	Exit Management Mode and return to Display Mode.

4. Adding External Disks

The MaxNAS has two rear USB ports, one front USB port, and one eSATA port for attaching external storage devices such as the Fantom Drives G-Force Megadisk lines of products, formatted in FAT32 or NTFS. Please note that NTFS volumes will be available in read only mode. The MaxNAS supports up to 6 external storage devices. Attached disks are accessible by navigating to \\[MaxNAS]\usbhdd\sd[x]\[y]
Where: [MaxNAS] is the netbios name or IP address of the MaxNAS, [x] refers to the port the disk is attached to, and [y] refers to the partition number. See chapter 4, Connecting Users, for more information on accessing shared data.

IMPORTANT: The MaxNAS cannot format external disks. In order to access external disks over the network, make sure your external disk is formatted as FAT32 or NTFS. **The MaxNAS can access NTFS partitions for reading only.**

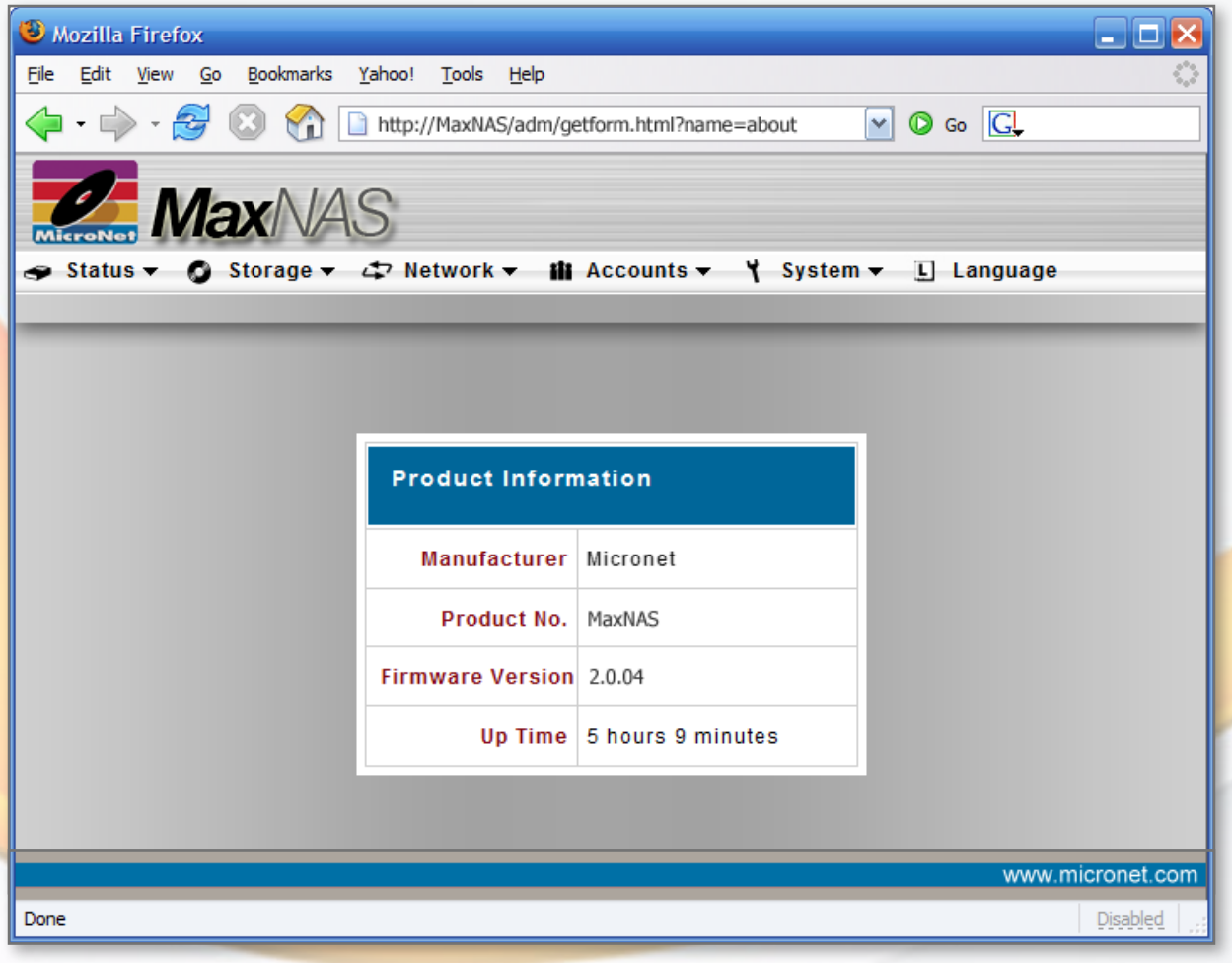
5. USB Target Mode

Your MaxNAS can present storage as an external USB disk device, connected via the USB type "A" target mode port on the back of the unit. Space for USB target mode must be allocated in RAID management screen (see chapter 3, Section 2.2.5 for more information), and will be recognized as an unformatted disk when initially connected to a host. Since the space allocated resides on the RAID, it will enjoy all performance and fault tolerance features afforded by the MaxNAS.

Chapter 3- Administering the MaxNAS

This chapter describes the menu and control structure for your MaxNAS. The RAID subsystem configuration utility is firmware-based and its operation is independent of host computer type or operating system.

At initial login, the user will be greeted with the Product Information Screen:



The administration user interface utilizes the pulldown menu desktop motif, and is organized as illustrated in the following table:

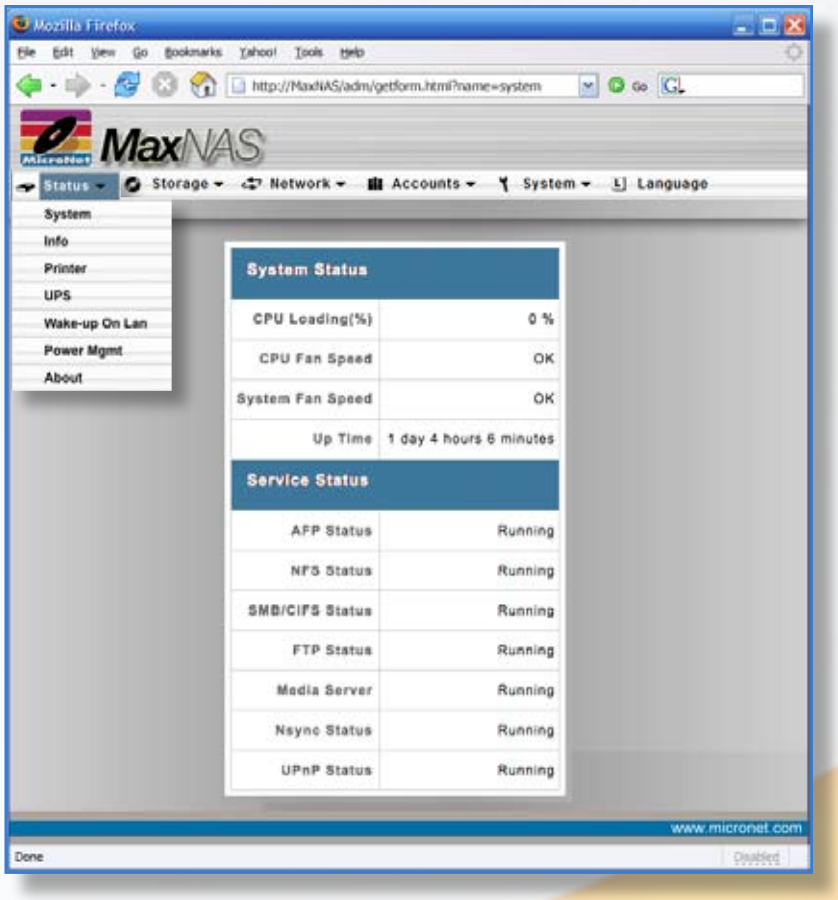
The Main Menu Configuration Tree

1. Status	1.1 System Status Information 1.2 USB Printer 1.3 Monitored UPS Status 1.4 Wake-on-LAN Configuration 1.5 Scheduled Power-On Configuration 1.6 Product Information (About)
2. Storage Configuration	2.1 Disk Information 2.2 RAID Configuration 2.3 Folder (Shares) Configuration 2.4 Filesystem check 2.5 Stackable iSCSI Host Mode 2.6 Mount ISO Disk Image
	2.7 nSync Synchronization Configuration
3. Network Configuration	3.1 LAN 1 Interface setup 3.2 LAN 2 Interface setup 3.3 Feature and Function Configuration
4. Accounts and Permissions	4.1 Authentication services configuration 4.2 Local User Configuration 4.3 Local Group Configuration
	4.4 Batch User Creation
5. System Configuration	5.1 Remote Notification 5.2 System Event Logs 5.3 System Time 5.4 Save/Recover System Configuration 5.5 Add On Module Management 5.6 Reset MaxNAS to Factory Defaults 5.7 Update Firmware 5.8 Change Administrator Password 5.9 Reboot/Shutdown 5.10 Logout from Administration applet 5.11 Interface Language

1. Status Displays

1.1 System Status

The Status window contains the basic system functionality indicators including current CPU load, uptime, disk information and health, and running services. To view the System Status, select "System" from the Status Menu.



1.2 System Information

This field is the verbose description that will describe this particular MaxNAS. To access the System Information definition field, select "Info" from the Status Menu. In the following screen, enter a descriptive name such as "Accounting Storage Server," that will differentiate it from other storage devices on the network. Click Apply to confirm, or Cancel to abort.

1.3 USB Printer Information

The MaxNAS can act as a print server to an attached USB disk server. To access the printer information page for the attached printer, select "Printer" from the Status menu. The Printer manufacturer and model information will appear as well as the current status (online or offline). You may remove a document from the print queue by clicking Remove. If the Printer service becomes inoperable you may reset the printer host service by clicking Restart.

1.4 Attached UPS Monitor Status

The MaxNAS will monitor and respond to UPS status messages from a compatible attached UPS (for a list of compatible devices, please see appendix D.) To access the UPS monitoring control , select Status -> UPS. The following table describes the options available. To confirm settings, click Apply.

Item	Description
UPS Monitoring	Enable or disable UPS monitoring.
Manufacturer	Choose the UPS manufacturer and model number from the dropdowns.
Battery Status	Current status of the UPS battery
Power	Current status of the power being supplied to the UPS
Seconds between power failure and first notification	Delay between power failure and first notification in seconds.
Seconds between subsequent power failure notifications	Delay between subsequent notifications in seconds.
Shutdown the system when the battery charge is less than [n]%	Amount [n] of UPS battery remaining before system should auto-shutdown.

1.5 Power Management

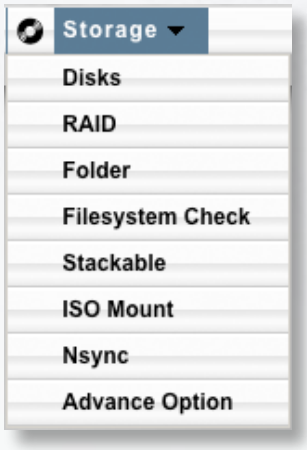
The MaxNAS can turn itself on and off according to a user preset schedule. To control the power schedule, navigate to "Status" -> "Power Management." To enable the scheduler, check "Enable Timer" as shown right. Enter the desired times to power on and off for each day of the week, and click Apply to activate. In order to access the MaxNAS during its scheduled downtime, the system employs the "Wake on LAN (WOL)" protocol. To enable WOL, navigate to "Status" -> "Wake up on LAN" and enable the service.

Note:
The MaxNAS will only wake in response to a special network command specific to the Wake on LAN protocol called "Magic Packet." For more information on how to generate a magic packet as well as WOL, consult your operating system documentation or http://en.wikipedia.org/wiki/Wake-on-LAN

1.6 About this MaxNAS (Info)

The About page details the name and firmware revision of the MaxNAS. It is the page that displays upon initial login.

2. Storage Configuration

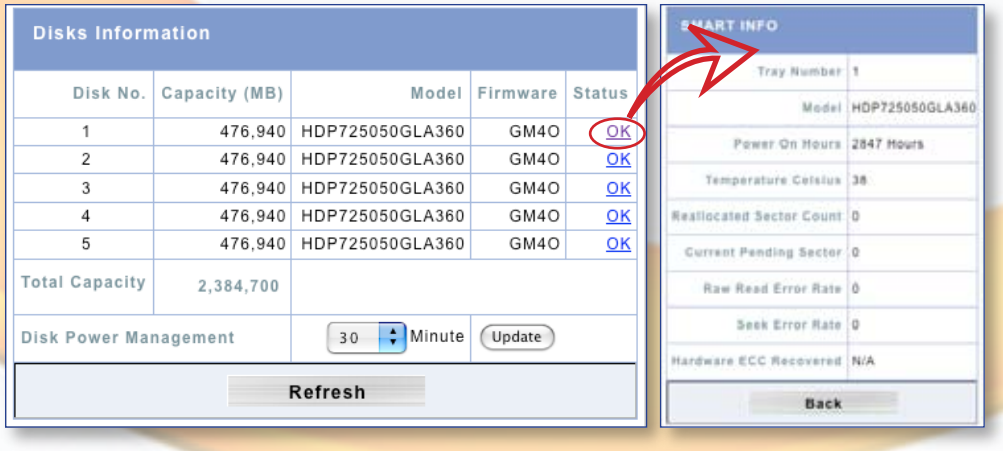


The storage configuration menu contains the following submenus:

- Disks (Informational)
- RAID
- Folder (Share)
- File System Check
- iSCSI stacked target host control
- ISO disk image mounting service
- nSync Task Configuration
- Advanced Options

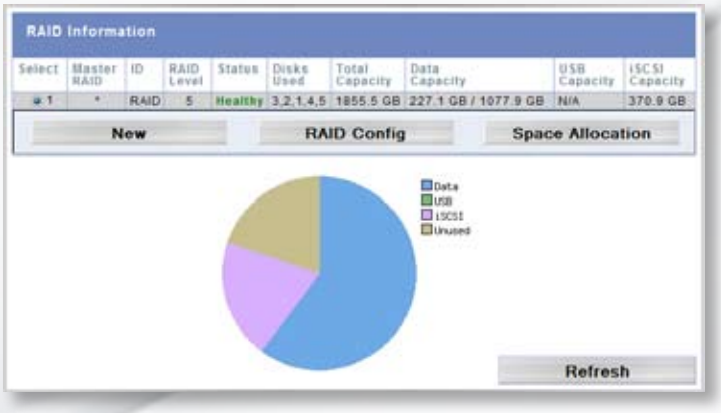
2.1 Disks (Info)

The disks menu displays the current capacity, the disk firmware revision, and current status, including SMART (Self-Monitoring, Analysis, and Reporting Technology) status of each disk drive mechanism. To view the Disk Info screen, navigate to *"Storage"* -> *"Disks"*. The rightmost column, "Status," will display the most recent SMART reported health status for each disk mechanism. To view the SMART results, click on the smart status indication next to the specified disk mechanism, and the detailed information will appear.



The MaxNAS can power down the disks when they are not accessed to save power. To enable disk power management, specify the idle time in minutes in the "Disk Power Management" Field and click Update.

2.2 RAID Menu



The RAID configuration screen displays the current storage organization of the MaxNAS, including RAID level, usable capacity along with target allocation, health and current operation progress the status of your RAID volumes. To view the RAID status screen, select "RAID" from the Storage Menu. The MaxNAS comes preconfigured

as a single RAID5 volume (See Chapter 5, *Understanding RAID*, for more information on RAID and RAID levels.) The following is a description of each information element:

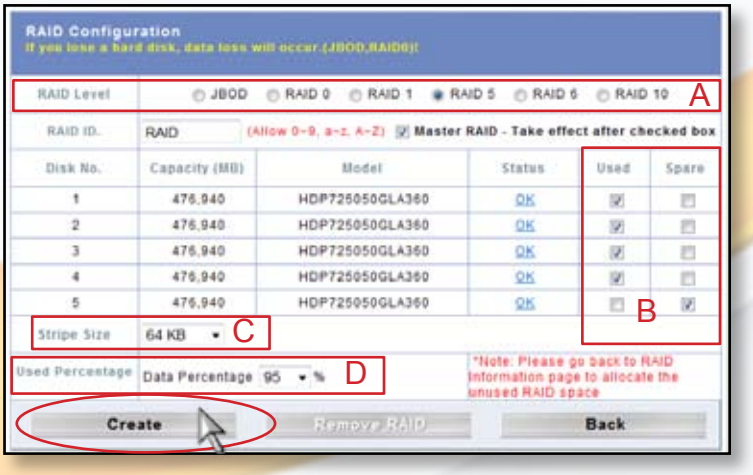
Item	Description
Select	Used to select the current RAID volume.
Master RAID	The RAID volume currently designated as the Master RAID volume.
ID	ID of the current RAID volume. Each volume must have a unique ID
RAID Level	Shows the current RAID configuration.
Status	Indicates status of the RAID. Can read either Healthy, Degraded, or Damaged.
Disks Used	Hard disks used to form the current RAID volume.
Total Capacity	Total capacity of the current RAID.
Data Capacity	Indicates the used capacity and total capacity used by user data.
USB Capacity	Indicates the capacity allocated to USB target mode.
iSCSI Capacity	Indicates the capacity allocated to iSCSI.

2.2.1 Create RAIDset

To create a new RAIDset, click New on the RAID information screen (see above, section 2.2.) The RAID Creation page will appear.

Note:
If clicking New does not activate the RAID creation screen there isn't sufficient space to create a new RAIDset. A RAIDset will have to be removed before a new RAIDset can be defined.

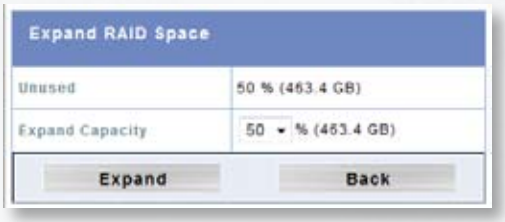
A. Select RAID Level (JBOD, RAID 0,1,5,6 or 10)
B. Check the disk modules to be used for RAID or as hot spare(s)
C. Select the Stripe Size (4K - 4096K, default 64K). Larger stripe size will aid in large file sequential transfers while smaller stripe size will aid in small or random file transfers.
D. Select the percentage of the resulting volume to be used for network access. Remaining space may be allocated for iSCSI or USB target mode.



Master RAID
In a multiple RAID configuration, one RAID volume must be designated as the Master RAID volume. The Master RAID volume will store all installed modules and system settings. If the Master RAID is changed to another location (i.e. assigning HDD 2 to be the Master RAID volume after HDD 1 had been previously assigned), then all modules must be reinstalled. In addition, all system folders that were contained on the Master RAID volume will be invisible. Reassigning this volume to be the Master RAID will make these folders visible again.

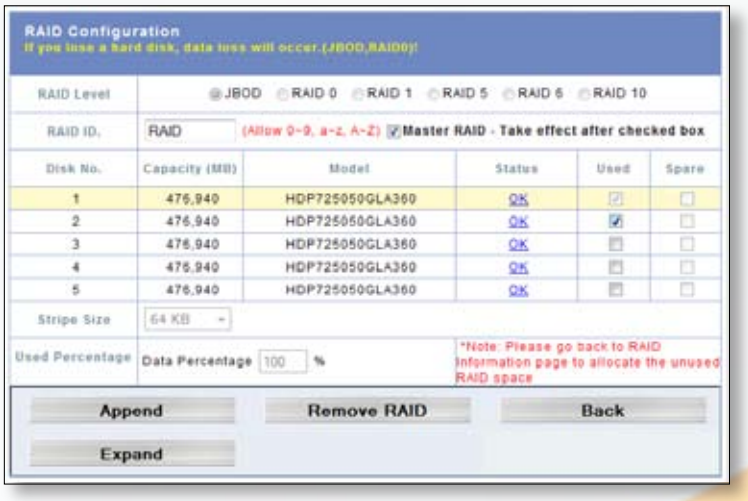
When all options have been checked, click Create. The MaxNAS will begin initialization. Please note that the shares cannot be created while RAIDset initialization is in progress.

2.2.2 Expanding NAS volumes



To expand the network accessible space of a RAIDset to take over unused space, select the desired RAIDSet and click RAID Config on the RAID information screen (see above, section 2.2.) The RAID Configuration page will appear. Click Expand. The Expand RAID Space screen will appear. Select the new percentage of the resulting volume to be used for network access. Remaining space may be allocated for iSCSI or USB target mode. Click Expand to complete the operation.

2.2.3 Appending disks to RAIDset



If an existing RAIDset does not use all available disk mechanisms it may be expanded onto the unused disk(s.) To expand an existing RAIDset, Select the desired RAIDSet and click RAID Config on the RAID information screen (see above, section 2.2.) The RAID Configuration page will appear. Select the desired available disk(s) and click Append.

2.2.4 Migrating RAIDSet

The MaxNAS allows RAIDsets to migrate on to unused disk modules as well as change the RAID level to fully utilize resources or to afford user flexibility. Online RAID level/stripe size migration can prove helpful during performance tuning activities as well as at the addition of physical disks to the MaxNAS. For example, in a system using two drives in RAID level 1, you could add capacity and retain fault tolerance by adding one drive. With the addition of third disk, you have the option of adding this disk to your existing RAID logical drive by migrating from RAID level 1 to 5. The result would be parity fault tolerance and double the available capacity without taking the system offline. To migrate a RAID 0, RAID 1, or RAID 5 volume, Select the desired RAIDSet and click RAID Config on the RAID information screen (see above, section 2.2.) The RAID Configuration page will appear. Click Migrate RAID. A list of possible RAID migration configurations will be listed. Select the desired migration scheme and click OK The following is a table of possible RAID migrations:

To→ / ↓ From	RAID 0	RAID 5
RAID 0	[RAID 0] HDDx2 to [RAID 0] HDDx3-5 [RAID 0] HDDx3 to [RAID 0] HDDx4-5 [RAID 0] HDDx4 to [RAID 0] HDDx5	[RAID 0] HDDx2 to [RAID 5] HDDx3-5 [RAID 0] HDDx3 to [RAID 5] HDDx4-5 [RAID 0] HDDx4 to [RAID 5] HDDx5
RAID 1	[RAID 1] HDDx2 to [RAID 0] HDDx2-5	[RAID 1] HDDx2 to [RAID 5] HDDx3-5
RAID 5	**X**	[RAID 5] HDDx3 to [RAID 5] HDDx4-5 [RAID 5] HDDx4 to [RAID 5] HDDx5

2.2.5 Delete RAIDSet

To Delete a RAIDset, Select the desired RAIDSet and click RAID Config on the RAID information screen (see above, section 2.2.) The RAID Configuration page will appear. Click on Remove RAID and confirm the operation in the following confirmation dialog.

2.2.6 Space Allocation

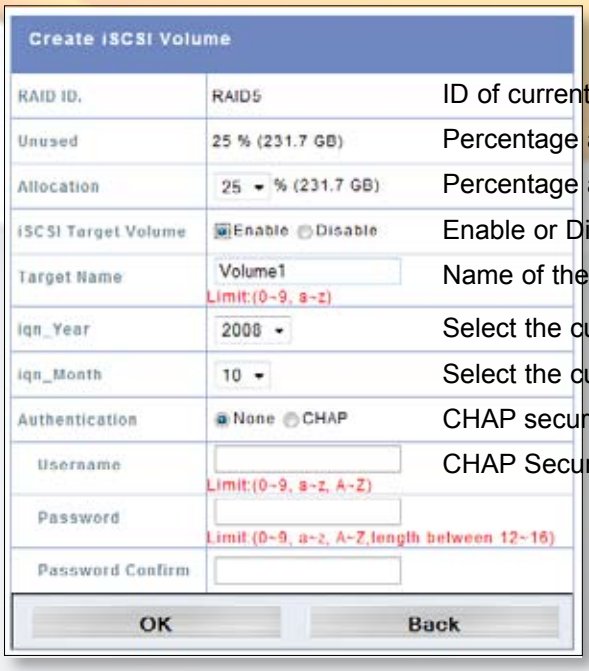
To control space allocation for Target USB and iSCSI volumes, Select the desired RAIDSet and click Space Allocation on the RAID information screen (see above, section 2.2.) The RAID Information and Volume Allocation List windows will appear. The Volume Allocation List displays the space allocated for Target USB and iSCSI volumes on the current RAID volume. Here you may create, modify, and delete target volumes.

Allocating Space for Target USB Volume

To allocate space for a Target USB volume on the current RAID volume, click Target USB. The Create Target USB Volume screen appears. Designate the percentage that should be allocated to the Target USB volume by selecting the appropriate percentage from the Allocation dropdown. Click OK to create the Target USB volume. The Target USB volume will appear to a host connected via the USB type "A" target mode port on the back of the unit, and will be recognize as an unformatted disk when initially connected. Since the space allocated resides on the RAID, it will enjoy all performance and fault tolerance features afforded by the MaxNAS.

Allocating Space for iSCSI Volume

To allocate space for an iSCSI volume on the current RAID volume, click iSCSI Target. The "Create iSCSI Volume" screen appears. Enter the values as listed below, and click OK to confirm.



ID of current RAID volume.

Percentage and amount of available space on current RAID volume.

Percentage and amount of space allocated to Target iSCSI volume.

Enable or Disable the iSCSI Target service.

Name of the iSCSI Target (used for stackable host service)

Select the current year from the dropdown.

Select the current month from the dropdown.

CHAP security authentication (on or off)

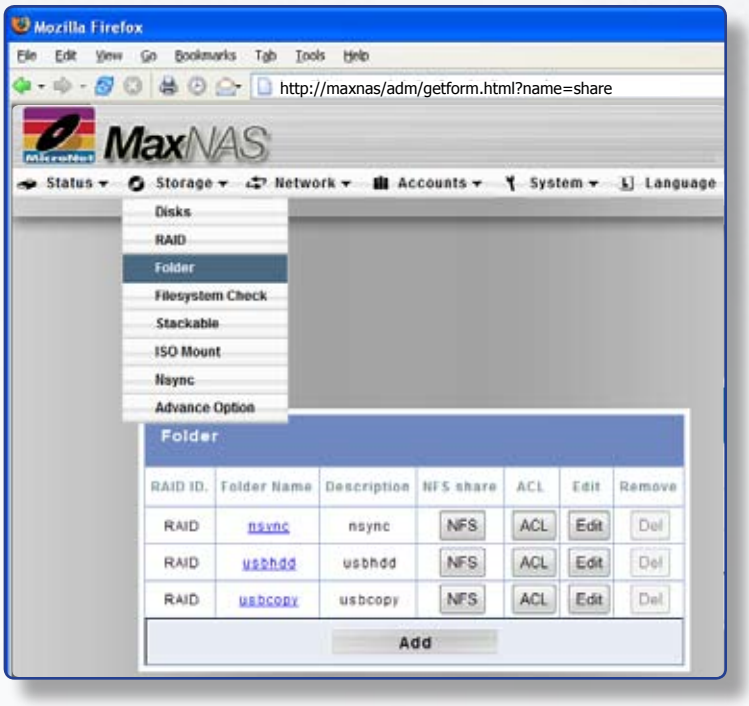
CHAP Security: Username.

Enter a password.

Reenter the chosen password

2.3 Folder (Share) Configuration

The Folder Screen, accessible through Storage -> Folder, allows you to create and configure folders on the RAID storage volume. The interface windows contains the following elements:



RAID ID	The RAIDset housing the share folder
Folder name	Displays the name of the Share folder.
Description	Provides a description of the Folder.
(NFS) Button	Click (NFS) to to configure NFS access.
(ACL) Button	Click (ACL) (Access Control List) to configure user access to this folder.
(Edit) Button	Click (Edit) to edit and modify the Folder's name and description.
(Del) Button	Click (Del) to delete the folder. A screen appears asking to confirm deletion.
(Add) Button	Click this button Add new folders

2.3.1 Adding Folders (Shares)

New shares can be created by clicking the Add button from the Folder screen. The Add Folder Interface Contains controls for the following elements:

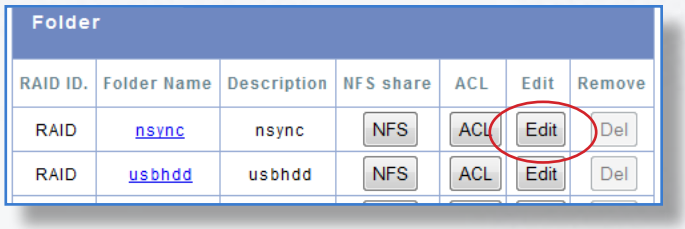
RAID ID	Select the RAIDSet to use for the share from the pulldown list
Folder name	Enter the name of the Folder.
Description	Provide a description the Folder.
Browseable	Whether the share will be visible when the MaxNAS is viewed through "network browsing". Yes/No
Public	Whether the share will be accessible to all regardless of permissions. Public shares will ignore ACL lists. Yes/No
Share size limit	Maximum space available in gigabytes up to the share size.

Click the Apply button to complete the folder creation or Cancel to abort.

Note:
You must set the ACL for each folder to allow access by specific users and groups; otherwise the folder will not be accessible. Remember to set ACLs whenever a new group or user are added to the MaxNAS.

2.3.2 Editing Folders (Shares)

Share properties can be modified by clicking the Edit button corresponding to the share. The Edit Folder Interface Contains controls for the following elements:



RAID ID	Select the RAIDSet to use for the share from the pulldown list
Folder name	Enter the name of the Folder.
Description	Provide a description the Folder.
Browseable	Whether the share will be visible when the MaxNAS is viewed through “network browsing”. Yes/No
Public	Whether the share will be accessible to all regardless of permissions. Public shares will ignore ACL lists. Yes/No
Share size limit	Maximum space available in gigabytes up to the share size.

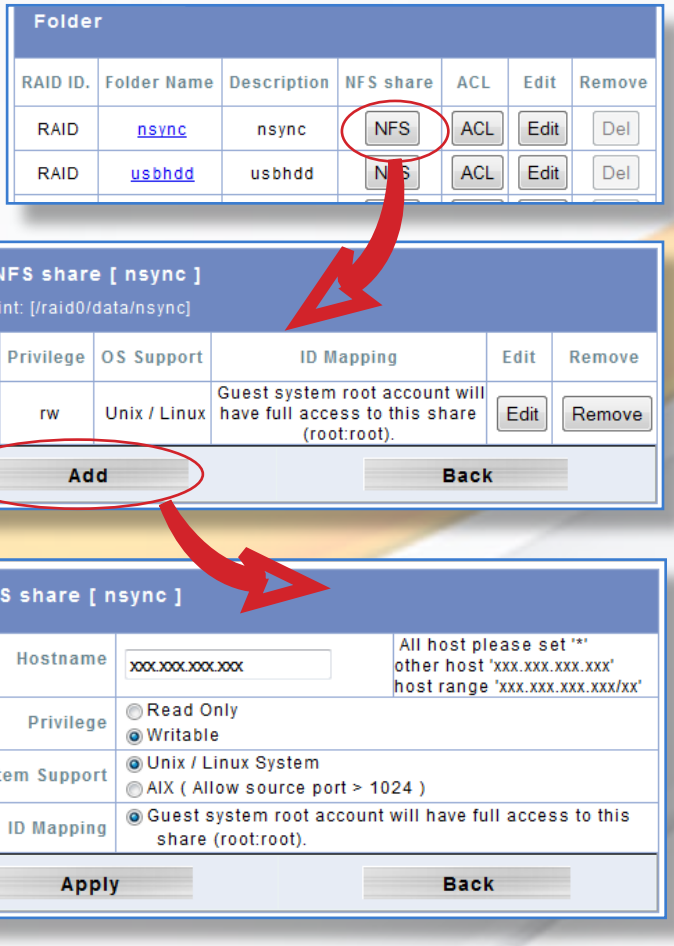
Click the Apply button to complete the folder creation or Cancel to abort.

2.3.3 NFS Configuration

To access and edit the NFS configuration, click NFS corresponding to the folder required. The NFS configuration screen will appear. In this screen you can add, edit existing or remove mount points for the selected share. to add a new mount point, click Add to launch the new NFS share window, and enter the following values:

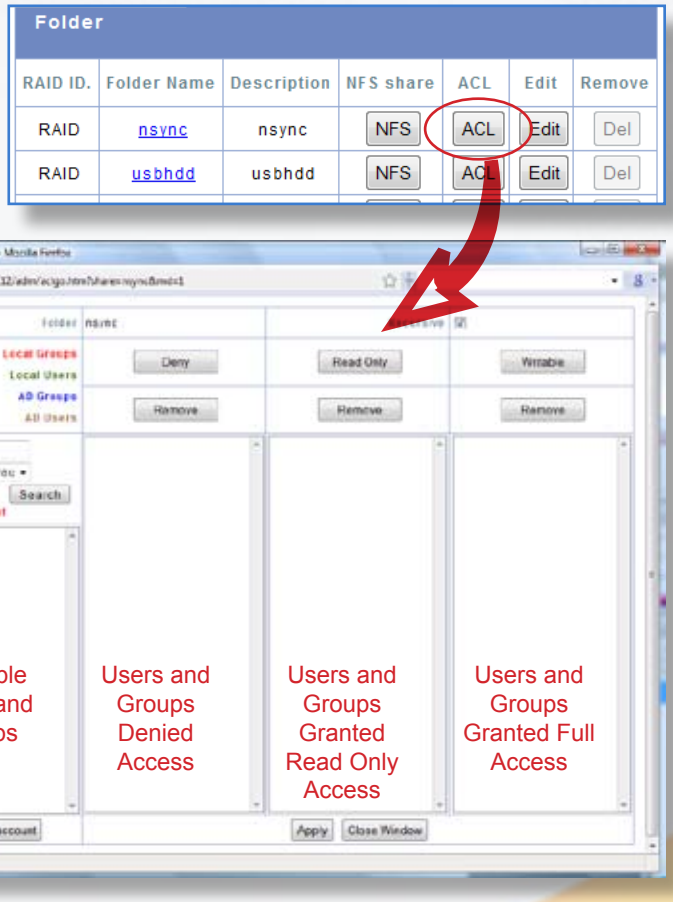
- Allowed Host(s) IP address or range
- Privilege level (Read Only/Writable)
- Guest OS (*nix/AIX)

Click Apply to create the NFS mount point, or Back to return to the Configuration screen. To edit an existing mount point, click Edit and all NFS share options will be available for editing. To remove an NFS share, click Remove.



2.3.4 Access Control Lists

Folder permissions are controlled via ACLs (Access Control Lists.) To access and edit ACLs, click ACL corresponding to the folder required. The Access control screen will appear. This screen allows you to configure access to the selected Folder for the users and groups. Select a user or a group from the left hand column and then click Deny, Read Only, or Writable to configure their access level. To remove a user access or limitation, select the user from the appropriate column and click Remove corresponding above. If your MaxNAS is a member of an Active Directory, you may specify Active Directory users and groups permissions as well (AD users will appear in amber, and AD groups will appear in blue.) Click Apply to complete the ACL modification, or Close Window to abort.



IMPORTANT: The ACL control Screen is a popup window. Make sure your browser allows popup windows for your MaxNAS session.

2.3.5 Deleting Folders (shares)

Shares can be removed by clicking Del corresponding to the folder required. A confirmation screen will appear. Click ACL to delete the share, or Cancel to abort.

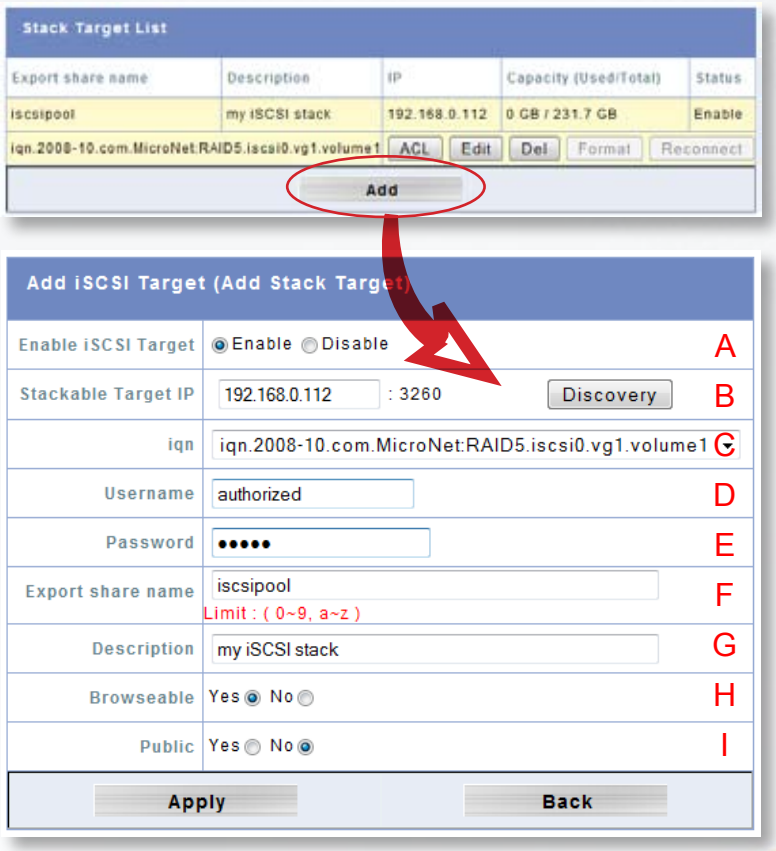
Note: The Del button will be greyed out (unavailable) for system reserved shares.

2.4 Perform file system check

Under normal circumstances it should not be necessary to perform a file system check on the MaxNAS. However, if the unit experienced a power outage or abrupt disconnection, it may be useful to manually perform a file system check. To perform a file system check, navigate to “Storage” -> “Filesystem Check”

2.5 Stackable iSCSI Host Service

The MaxNAS can aggregate up to 5 iSCSI targets and offer all networking services to those targets, regardless of where the storage is located physically. To access the Stackable Host Service control, navigate to "Storage" -> "Stackable" and the Stack Target List screen will appear. In this screen you can add, edit existing or remove mount points.



2.5.1 Adding a new iSCSI target

To add a new iSCSI Target, click Add to launch the Add new iSCSI Target window, and enter the following values:

A. Target Sevice enable/disable
B. Target IP Address
C. Target IQN (iSCSI Qualified Name). The MaxNAS can detect the IQN for most iSCSI initiators by clicking Discovery.
D. Authorized username (for CHAP enabled iSCSI target)
E. Authorized password (for CHAP enabled iSCSI target)
F. Export share name- the name of the shared folder that will appear for network mounting, limited to lower case and numeral characters.
G. Export share name description
H. Check whether the share is browsable (see section 2.3 for more information)
I. Check whether the share is public. If a share is non public, ACLs will have to be defined in the Stacked Target List window (see section 2.3 for more information)

To complete the operation, click Apply or Back to abort. In order for the MaxNAS to share the volume, it will have to be formatted for MaxNAS use.

WARNING: Formatting the iSCSI target will erase all existing data! Exercise caution before proceeding!

To format the stack, click Format corresponding to the iSCSI mount required on the stack list screen.

2.5.2 Set Stackable Share Permissions

Folder permissions are controlled via ACLs (Access Control Lists.) To access and edit ACLs, click ACL corresponding to the iSCSI mount required. The Access control screen will appear. Please refer to section 2.3.4 of this chapter for more information.

2.5.3 Edit Stackable parameters

To modify a Stackable shared iSCSI Target, click Edit to launch the edit iSCSI Target window,

Please refer to section 2.5.1 of this chapter for more information.

2.5.4 Delete a Stackable shared iSCSI mount

To delete an stackable shared iSCSI mount, click Delete corresponding to the desired iSCSI mount. A confirmation dialog box will appear. Click OK to remove the mount, or Cancel to abort.

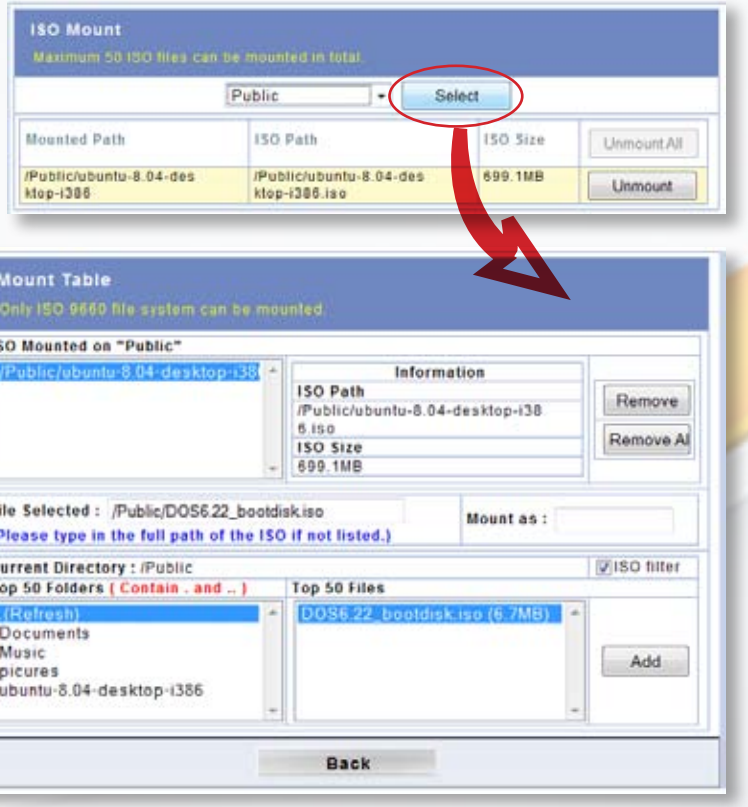
WARNING: Deleting a Stackable shared iSCSI mount will erase all data on it!

2.5.5 Reconnect an offline iSCSI target

In case of lost connectivity between the MaxNAS and the iSCSI target shared, it may be necessary manually reconnect. Please make sure that the iSCSI target device is online and accessible, and click Reconnect corresponding to the desired iSCSI mount. The connection should be re-established.

2.6 Mount and Share ISO disk image

The MaxNAS can mount ISO disk images and present them as networked shares. To access the ISO mount control, navigate to "Storage" -> "ISO Mount" and the ISO Mount List screen will appear. In this screen you can add, edit existing or remove ISO image shares.



2.6.1 Adding a new ISO image share

To add a new ISO image share, select the sharepoint where the ISO image resides from the pulldown, and click Select to launch the Mount Table window. You can navigate the chosen share file system on the bottom left window, and a list of allowable disk images will appear on the bottom right pane. Select the image to be mounted from the bottom right pane, and optionally enter a custom mount point in the "Mount As" Entry box above. Click Add to mount the image, and it will be accessible to network clients in the path shown at the top left windowpane. ISO Shares will be accessible according to the parent share access controls.

2.6.2 Removing ISO image shares

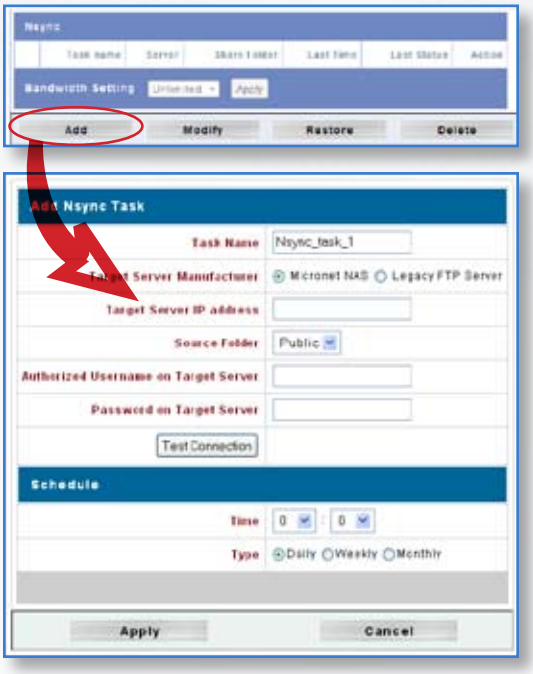
To remove ISO image shares, select the desired share from the mounted list windowspane (top left) and click Remove. Alternatively, you may remove all shared ISO images by clicking Remove All. No data will be lost by this operation.

2.6.3 Temporarily unmount ISO image shares

To temporatily unmount ISO image shares, select the desired share from the ISO mount list screen and click Unmount. No data will be lost by this operation.

2.7 nSync Backup Service

nSync is an FTP compatible synchronization method that allows backup and restoration of a share folder to another MaxNAS Target or any FTP server. When using nSync between two MaxNAS units, the synchronization also supports secure encryption. nSync can scheduled to run once, daily, weekly, or monthly. The available bandwidth for nSync tasks can be limited to reduce impact on network availability. The nSync configuration screen is accessible by selecting "nSync" from the Storage menu.



2.7.1 Create new nSync backup task

To create a new nSync task, click Add. The Add nSync task control page will appear with the following elements:

Task Name	Enter a name for the nSync scheduled job.
Target Manufacturer	Select whether the target is a MaxNAS or FTP server.
Target IP Address	The IP address of your target server
Nsync Source Folder	The share folder you want to backup. See section 2.3 for more information
AUTH ID	The account ID on the target server.
AUTH Password	The password for the AUTH ID on the target server.
Scheduled Time	The time when the Nsync task will run.
Schedule Type	Select whether to run the Nsync task daily, weekly, or monthly. Day of week and day of month are user selectable.

It is recommended the nSync link be tested before it is committed for connectivity and to verify proper credentials. When the nSync task is created and all task fields have been entered, click the (Test Connection) button to verify the address and credentials. Once the task has been verified, enter the scheduled time and frequency, and click Apply to complete set the LAN configuration, or Cancel to abort. See Chapter 4 Section 4 for additional information.

2.7.2 Modify an existing nSync task

To modify an existing nSync task, check the checkbox next to the task name and click Modify Refer to section 2.5.1 for detailed field information. It is recommended the nSync link be tested before it is committed for connectivity and to verify proper credentials. When the modifications to the nSync task are entered, click Test Connection to verify the address and credentials. Once the task has been verified, click Modify to complete set the LAN configuration, or Cancel to abort.

2.7.3 Deleting an existing nSync task

To delete an existing nSync task, check the checkbox next to the task name and click Delete. A confirmation dialog box will appear. Click OK to remove the nSync task, or Cancel to abort.

2.7.4 Running an nSync backup task

A task will launch automatically as scheduled, but may also be launched manually by checking the checkbox next to the task name to run and clicking Start in the action section. The "Last Status" section will display a button labelled In Progress and will change to Success when the backup is complete. Click either In Progress or Success at any time to launch a window with the log of the task.

2.7.5 Restoring to a previously synchronized state

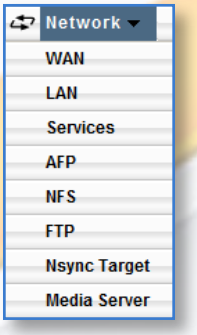
To restore a previously synchronized state, check the checkbox next to the task name to restore and click Restore. The "Last Status" section will display a button labelled In Progress and will change to Restore Success when the restoration is complete. Click either In Progress or Restore Success at any time to launch a window with the log of the restoration.

2.7.6 Setting transfer speed limits

The nSync process can consume as much or as little of the available network bandwidth as it is allowed to utilize. The more bandwidth that is available, the faster the nSync task can complete, but at a cost of less available user bandwidth. The available nSync bandwidth can be controlled by selecting a value in the bandwidth setting control box (ranging from 256 Kbit/Sec to unlimited) and clicking Apply.

3. Network Configuration

Network Configuration is accessible by selecting the network menu. It consists of setting LAN port specific functions for each interface, and Network services, accessible via submenus (illustrated right.)



3.1 LAN1 Configuration

The LAN Configuration screen for the LAN1 Interface allows for the following controls:

When you are ready to commit changes click Apply.

3.1.1 Host Name

The host name is the WINS name for the MaxNAS, and will be the name shown in your Windows network.

3.1.2 Domain Suffix

The Domain Name refers to your DNS network suffix. This value is necessary for proper DNS or Active Directory network participation. Consult your network administrator for more information regarding this value.

3.1.3 MAC Address

A unique Media Access Control (MAC) address. This value is not modifiable.

3.1.4 Jumbo Frames Support

WARNING: Make sure all your client devices, hubs, switches, and gateways can support Jumbo frames of the proper size before enabling this feature. Failure to do so may render the network port of your MaxNAS inaccessible!

Jumbo frame support is a feature which allows Ethernet hardware to send, receive, or transport Ethernet frames greater then 1518 bytes in size, which is the standard Ethernet packet size. The MaxNAS supports jumbo frames of 4000 and 16000 bytes MTU. Jumbo frames can only function if all the network devices can support the same size jumbo packets, so please verify that all your client devices, hubs, switches, and gateways can support it before you enable jumbo frames.

3.1.5 DHCP

DHCP Allows for dynamic IP address assignment on TCP/IP networks. It is the preferred method to manage IP address assignments and is the default assignment of the LAN1 port on the MaxNAS. You may set a static IP address by disabling DHCP.

3.1.6 Static IP

The IP address, Netmask, Gateway, and DNS Servers are only required if DHCP is disabled. Consult your network administrator for more information on these values as they are unique to your network.

3.1.7 IP Forwarding

The MaxNAS can route IP traffic from LAN2 to LAN1 using IP forwarding. When used in conjuction with DHCP services on LAN2 (see section 3.2.4) the MaxNAS can act as a router within a two subnet environment. To enable IP routing, check the “enabled” checkbox and follow the on screen instructions.

3.1.8 Link Aggregation

IMPORTANT: 802.3ad link aggregation requires the use of a link aggregation capable router. Consult your router’s documentation to assure compatibility and configuration instructions.

The MaxNAS supports IEEE 802.3ad link aggregation, which defines a method for using multiple Ethernet network cables/ports in parallel to increase the link speed beyond the limits of any one single cable or port and to increase the redundancy for higher availability. The following modes of operation are available:

- Failover: When one port fails the other one will take over.
- Load Balance: Ethernet traffic will flow along both Ethernet ports.
- 802.3ad: Links two Ethernet ports in parallel to increase throughput.

3.2 LAN2 Configuration

The LAN Configuration screen for the LAN2 Interface allows for the following controls:

Jumbo Frame Support
IP Address
Netmask
DHCP Server

When you are ready to commit changes click Apply.

3.2.1 MAC Address
A unique Media Access Control (MAC) address. This value is not modifiable.

3.2.2 Jumbo Frames Support

WARNING: Make sure all your client devices, hubs, switches, and gateways can support jumbo frames of the proper size before enabling this feature. Failure to do so may render the network port of your MaxNAS inaccessible!

Jumbo frame support is a feature which allows Ethernet hardware to send, receive, or transport Ethernet frames greater then 1518 bytes in size, which is the standard Ethernet packet size. The MaxNAS supports jumbo frames of 4000 and 16000 bytes. Jumbo frames can only function if all the network devices can support the same size jumbo packets. Please verify that all your client devices, hubs, switches, and gateways can support it before you enable jumbo frames.

3.2.3 Static IP
The LAN configuration for the LAN2 port is similar to the Primary Interface but only allows modification of the IP address and Netmask. The LAN2 Interface does not support DHCP address assignment.

3.2.4 DHCP Server
DHCP allows for dynamic IP address assignment on TCP/IP networks. Your MaxNAS can serve as a DHCP server to a network attached on LAN2. When enabled, it will dynamically assign an available IP address from the range specified between the “Start IP” entry box and the “End IP” entry box as well as DNS server addresses.

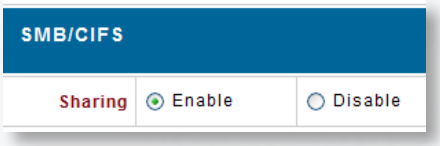
3.3 Network Services Configuration

The MaxNAS offers the following network services:

- SMB/CIFS (Server Message Block) or “Windows” Networking
- Webdisk (Web Browser Storage) and Secure Webdisk
- UPNP (Universal Plug and Play) automatic detection and configuration
- Apple File Protocol Service
- NFS Service
- FTP Service
- nSync Target Service
- DLNA Streaming

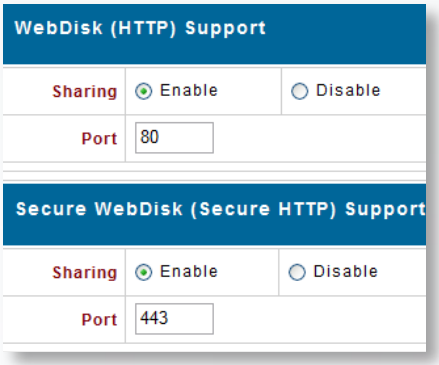
It is recommended that you disable services you will not require for security purposes. See Chapter 4 for details on how to use these technologies in Windows and Macintosh environments.

3.3.1 SMB/CIFS



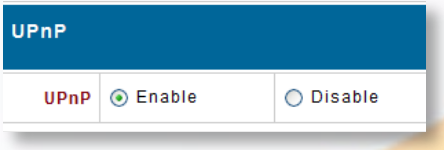
The Server Message Block network protocol is the most widely used network protocol. It is used by all variants of the Microsoft Windows operating system, Apple Macintosh OS X, and most Unix and Linux variants include support for it even if using a different networking protocol. You may enable or disable SMB/CIFS support by navigating to "Network" -> "Service." Click Apply to complete the operation.

3.3.2 Webdisk/Secure Webdisk



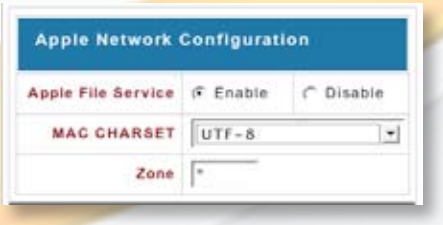
The Webdisk functionality allows your shares to be accessible from any web browser with a path to the MaxNAS. This is a powerful networking option and must be used with care in networks that are externally accessible to the internet. Webdisk and Secure Webdisk must have different TCP ports in order to be used simultaneously. You may enable or disable Webdisk and Secure Webdisk support as well as user definable TCP ports by navigating to "Network" -> "Service." Click Apply to complete the operation.

3.3.3 UPNP Universal Plug and Play



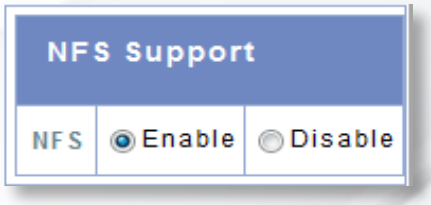
UPNP allows automatic discovery of the MaxNAS Administration Interface by clients that support the protocol. You may enable or disable UPNP support by navigating to "Network" -> "Service." Click Apply to complete the operation.

3.3.4 Apple File Protocol Services



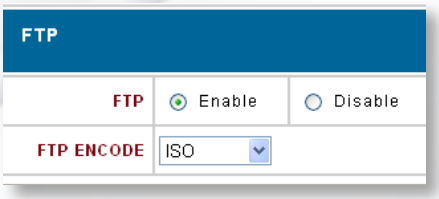
The AFP protocol is used by Apple Mac OS 9.x and prior for networking and is supported by all Mac OS-X hosts as well. To enable AFP support navigate to "Network" -> "Apple Network Configuration." You may enable, disable, set the character languageset, and specify zone (optional). Click Apply to complete the operation.

3.3.5 NFS Services



NFS (Network File System) is a network file system protocol originally developed by Sun Microsystems in 1983 allowing a user on a client computer to access files over a network as easily as if the network devices were attached to its local disks. It is most commonly used on Unix and Linux based networks. You may enable or disable NFS server support by navigating to "Network" -> "NFS." Click Apply to complete the operation.

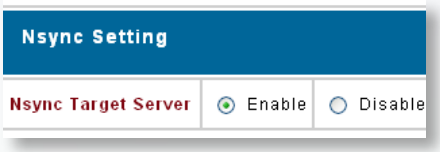
3.3.6 FTP Services



FTP (File Transfer Protocol) is a commonly used, open standard protocol for exchanging files over any network that supports the TCP/IP protocol (such as the Internet or an intranet). Virtually every computer platform supports the FTP protocol. This allows any computer connected to a TCP/

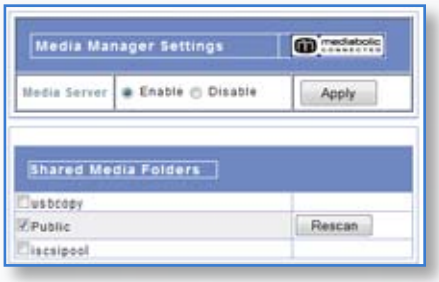
IP based network to manipulate files on another computer on that network regardless of which operating systems are involved (if the computers permit FTP access.) There are many existing FTP client and server programs, and many of these are free. You may enable or disable FTP server support as well as supported file character set language by navigating to "Network" -> "FTP." Click Apply to complete the operation.

3.3.7 nSync Target Service



nSync is an FTP compatible synchronization method that allows backup and restoration of a share folder to another MaxNAS Target or any FTP server. When using nSync between two MaxNAS units, the synchronization also enables secure encryption. You may enable or disable nSync target support by navigating to "Network" -> "nSync." Click Apply to complete the operation.

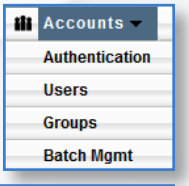
3.3.8 Mediabolic DLNA Server



The MaxNAS provides media streaming service to standalone networked home media adapters that support the UPnP-AV protocol or are Digital Living Network Alliance (DLNA) standard compliant. This allows shared digital media such as music, pictures, and movies with any compatible device throughout your entire home. For more information and a list of compatible devices please visit www.dlna.org

To configure the media server, navigate to "Network" -> "Media Server" and the Media Manager Settings window will appear. To enable or disable the streaming service, check the radio button corresponding to "enable" or "disable" and click Apply. The service will index and share all compatible media files in the shares checked in the bottom pane. The media server will appear to your compatible DMA (digital media adapter) as "MaxNAS:Mediabolic Server."

4. Accounts Configuration



Account Configuration allows for users and groups creation and integration into a Microsoft Windows Active Directory or domain. Account Configuration is accessible from the "Accounts" menu.

4.1 Authentication Configuration

The MaxNAS can authenticate with and use Microsoft server resources such as WINS (Windows Internet Naming Service,) Workgroup or Domain assignment, and ADS. The Microsoft Support configuration screen is accessible from "Accounts" -> "Authentication." This screen displays the directory support parameters of the system as follows:

- WINS Server: Specifies the WINS server if necessary.
- Workgroup/Domain Name: Specifies the SMB/CIFS Work Group/NT Domain name.
- ADS Support: Enabled to join a Microsoft domain/AD or disabled for workgroup support.

- ADS Server Name: Specifies the AD domain controller or NT PDC.
- ADS Realm: Specifies the fully qualified ADS realm (Domain).
- Administrator ID/password: Domain administrator credentials- required for permission to join an Active Directory.

Consult your network administrator for assistance with joining the MaxNAS to an Active Directory. When all fields have been entered, click Apply to begin the authentication process. See "Appendix C- Active Directory" for more information.

4.2 Group Administration

When providing shares to non Active Directory clients, the MaxNAS provides its own user and group administration. The Local Group Administration screen is accessible by selecting "Groups" from the Accounts menu. Permissions and authorization for users and groups are assigned to each folder shared- See section 2.3 of this chapter for more information.

4.2.1 Creating Groups

To create a new group, click Add in the Local Group Configuration screen (illustrated above, right.) In the following screen enter the new group name and assign users by selecting the desired users from the "Group List" pane and clicking the << button. Please note that spaces, slashes or commas are not valid for group names. Click Apply to finalize the action or Back to abort.

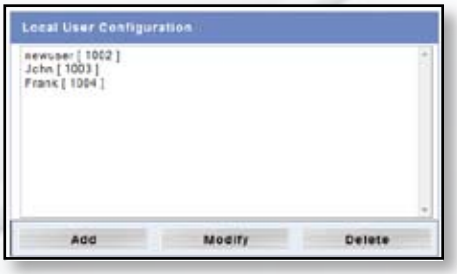
4.2.2 Removing Groups

To remove a group, select the group in the Local Group Configuration Screen to remove and click Delete.

4.2.3 Modifying Existing Groups

You may modify any groups' user membership by selecting the group and clicking Modify. The Local Group Setting dialog will appear. To add a user to the group, highlight the desired users in the "Users List" pane and click the << button. To remove a group membership from the selected user, highlight the desired users in the "Member List" pane and click the >> button. When changes to the user's group membership are complete, click Apply to finalize the action.

4.3 Local User Configuration



When providing folder access to non Active Directory clients, the MaxNAS provides its own user and group administration. Creating and administering user accounts are accessible by selecting "Users" from the Accounts menu. This screen allows you to configure local user settings and assign or remove group membership. Permissions and authorization for users and groups are assigned to each folder shared- See section 2.3 of this chapter for more information.

4.3.1 Creating Users

To create a new user, click Add in the User Configuration screen. In the following screen (see illustration right) enter the new username, password in the "Password" and "Confirm" fields, and assign group membership by selecting the desired groups from the "Group List" pane and clicking the << button. Please note that spaces, slashes or commas are not valid for user names. Click Apply to finalize the action or Back to abort.

4.3.2 Removing Users

To remove a user, select the group in the Local User Configuration screen to remove and click Delete.

4.3.3 Modifying Existing Users

You may change user passwords and group assignment by clicking the Modify button.

- To change a user password, enter the new password in the "Password" and "Confirm" fields. Click Apply to finalize the action or Back to abort.
- To modify a user's group membership, highlight the desired group in the "Group List" pane and click the << button to add a new group membership. To remove a group membership from the selected user, highlight the desired group in the "Group Member" pane and click the >> button. When changes to the user's group membership are complete, click Apply to finalize the action or Back to abort.

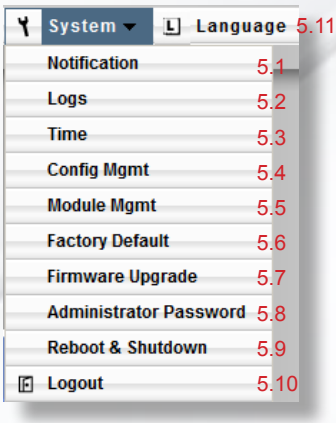
4.4 Batch User and Group Creation

The MaxNAS can import lists of users and groups for batch user and group creation. The list must be a comma-separated plain text (*.txt) in this line format:

[USERNAME], [PASSWORD], [GROUP]

To import a user list for batch creation, navigate to "Accounts" -> "Batch Mgmt". Select the text file previously created, or click Edit to create the list manually or edit the loaded file. Click Import to complete the operation.

5. System Control Functions



The system control functions, accessible from the "System" menu, facilitate the following functions via submenus:

- Remote Notification Configuration
- Event Logs
- System Time
- Save/Recover System Setting
- Configure Add-on Modules
- Reset MaxNAS to Factory Default
- Upgrade Firmware
- Reboot/Shutdown
- Logout from Administration
- Change Administrator Password
- Schedule On/Off
- Change the user Interface Language

5.1 Remote Notification Configuration

The MaxNAS features an SMTP manager and can send email notifications for various subsystem conditions in addition to the audible buzzer. The following table discuss each attribute's descriptions.

Enable or Disable system beeper that beeps when a problem occurs.
Enable or Disable e-mail notification of system problems.
Enter your network's SMTP server's network IP address and port (commonly 25)
Set SMTP Authentication type and SMTP account ID and password (in both "Account Password" and "Confirm Account Password" fields.) This may be required to authenticate the MaxNAS to the SMTP server. Some SMTP servers do not require a user ID and password. Consult your network administrator for more information.
Set the sender address for the email alert
Recipients' (up to 4) e-mail addresses for notification of system events.

When all desired options are entered click Apply. To verify your SMTP settings and connectivity functionality, click Test to generate a test email.

5.2 Event Logs

From the System menu, choose the Logs item and the System Logs screen appears. This screen lets you configure and manage system logs which provide a history of system usage. A description of each item follows:

IMPORTANT: The logs will display in a popup window. Make sure your browser allows popup windows for your MaxNAS session.

I<< < > >>I	Use these buttons to browse the log pages.
INFO	Provides all log information including warning messages and error messages.
WARN	Shows all warning messages and error messages only.
ERROR	Shows only error messages.
GO	Specify the number of lines per page and click Go.
Ascending	Shows logs by date in ascending order.
Descending	Shows logs by date in descending order.
Download Logs	Download the whole system log in a .tar.gz format. This file can then be forwarded to MicroNet Technical Support for troubleshooting.

5.3 System Time

To set the system time and date, navigate to "System" -> "Time" and the Time screen appears. Set the desired date, time, and time zone. When all desired options are entered, click Apply

5.4 Save/Recover System Setting

When all configuration options for the MaxNAS are entered and the unit is functioning correctly, it is recommended that you save your system settings to a settings file for safekeeping. Should the MaxNAS ever have to be reformatted or reset, you will then be able to retrieve all your settings, users, groups, and permissions from this file. To access the Save/Recover System Settings screen, select "System" -> "Config Mgmt."

- To save current settings to a file, click Download. The file will download to your computer.
- To retrieve an existing settings file, click Browse next to the Upload entry box. Navigate and select your saved settings file. Click Upload to retrieve the settings and confirm the operation in the following confirmation dialog.

5.5 Module Management

MicroNet strives to continually improve and from time to time will release additional features, or modules, for the MaxNAS. Modules offer additional functionality without replacing the base operating code or firmware. Modules will either be made available on MicroNet's website or provided by MicroNet Technical Support. To access the module management, navigate to "System" -> "Module Mgmt."

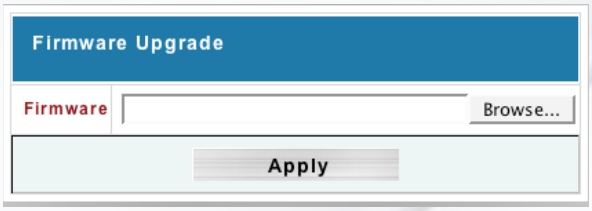
- To install a new module, click Browse next to the Module file entry box. Navigate and select the module file. Click Install to begin the upload, and confirm the operation in the following confirmation dialog.
- To enable, disable, or uninstall a module, check the checkbox left of the module and click the respective function button Uninstall, Enable, or Disable. Confirm the operation in the following confirmation dialog.

5.6 Reset to Factory Default

Should it become necessary to reset all settings to factory default, access the Reset to Factory Settings screen from "System" -> "Factory Default." Click Apply to reset the unit, and confirm the operation in the following confirmation dialog.

WARNING: Resetting to factory default will erase all data!

5.7 Update Firmware



MicroNet strives to continually improve our products, and from time to time will release firmware updates for the MaxNAS. Firmware will either be made available on MicroNet's website or provided by MicroNet Technical Support. To access the Firmware Upgrade, navigate to "System" -> "Firmware Upgrade." Click Browse next to the Firmware entry box. Navigate and select your saved settings file. Click Apply to begin the upload and confirm the operation in the following confirmation dialog.

IMPORTANT: Make sure all user data and system settings are backed up before updating firmware!

5.8 Change Administrator Password

To change the administrator password or the LCD access password navigate to "System" -> "Administrator Password" and the Administration password screen appears. Enter the new password in the "New Password" field and re-enter the password (case sensitive) in the "Confirm Password" field. When both fields are entered click Apply to confirm.

5.9 Reboot/Shutdown

To cleanly shut down or reboot the MaxNAS navigate to "System" -> "Reboot and Shutdown." In the following screen, click Reboot to restart the unit or Shutdown to turn off the unit.

IMPORTANT: Use the Reboot/Shutdown system functions to turn off the unit cleanly. **Shutting down using the power button may result in data loss!**

5.10 Log Out of the Administration Interface

To log out of the MaxNAS Administration User Interface navigate to "Log Out" at the right edge of the menu bar. A confirmation dialog will appear. Confirm the operation to log out to the main login page.

5.11 Change the User Interface Language

The MaxNAS supports multiple language user interface, including English, French, German, Italian, and Chinese. To change the user interface language select "Language" from the Menu. In the following screen select the desired interface language. Click Apply to confirm.

Chapter 4- Connecting Users

Once the MaxNAS has been configured with storage, shares, users, groups, and permissions it is ready to accept user connections. The MaxNAS supports SMB/CIFS network services as well as Webdisk/Secure Webdisk user connections. This chapter includes discussion on both of those services and connection methods.

1. SMB/CIFS User Access Configuration

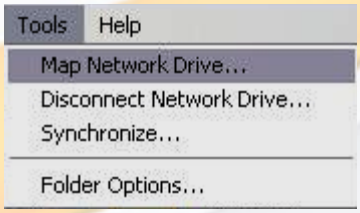
SMB shares are accessible from Windows 95 and newer, OS-X 10.2 and newer, and most Unix/Linux based workstations. Instructions are included for Windows and Macintosh based hosts. *nix users should consult the specific distribution and/or SAMBA documentation for usage instruction.

1.1 Mapping a Network Drive (Windows)

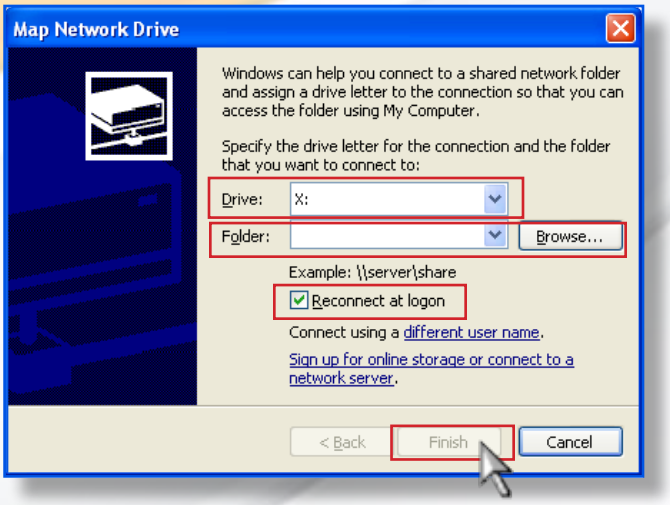
To access the MaxNAS from a Windows based host, open "My Network Places" (Windows XP) or "Network Neighborhood" on Windows 98/2000. The MaxNAS is called "MaxNAS" in workgroup "Workgroup" by default. Double click to see the available shares. Alternatively, you may use Window's search function to look for computers named "MaxNAS."

You can map share folders on the MaxNAS so you can access them through the My Computer folder in Windows. Connect to the shared network folders on the MaxNAS as follows:

1.1.1 Double click "My Computer"
1.1.2 In the menu bar select "Tools" -> "Map Network Drive"
1.1.3 The Map Network Drive… window appears.



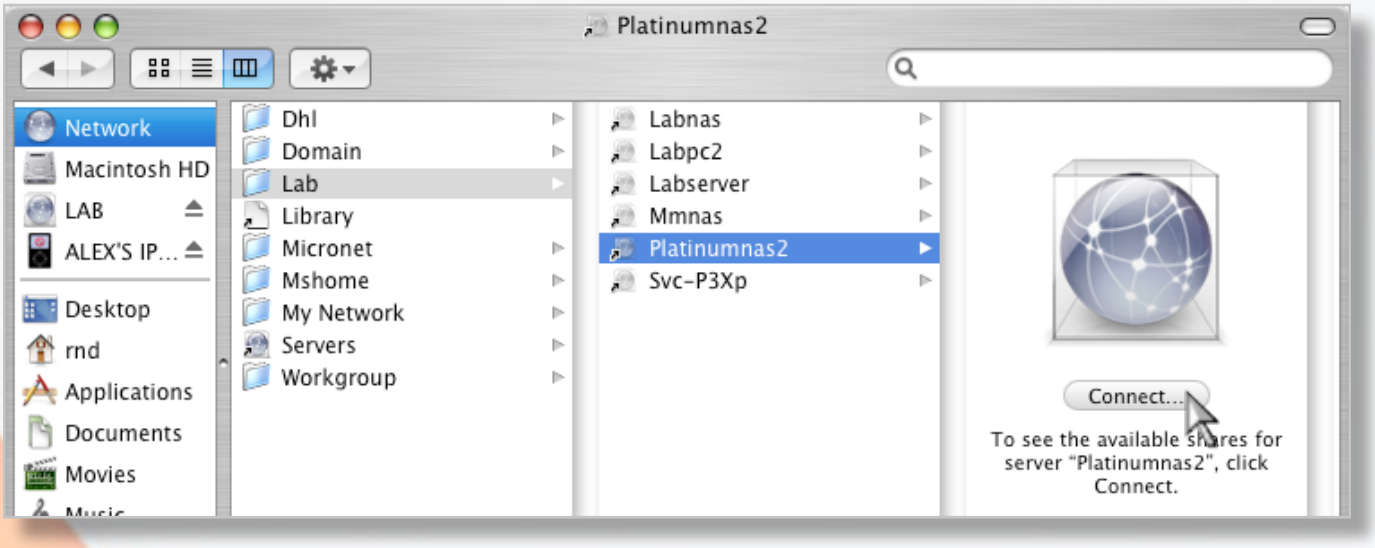
- Select the desired drive letter in the "Drive" field
- Use the Browse button to find the folder over your network, or enter the share manually as "\\[MaxNAS]\[sharename]" where [MaxNAS] is the name or IP address of the MaxNAS and [sharename] is a specific share being mapped.
- Check the "Reconnect at Logon" checkbox to make the share reconnect on reboot.
- Click Finish. If the share is not public a "Connect As…" window appears. Enter an authorized User name and Password.



- Click OK. The share folder appears as the drive you assigned in your My Computer window. You can now access this folder as though it were a drive on your computer.

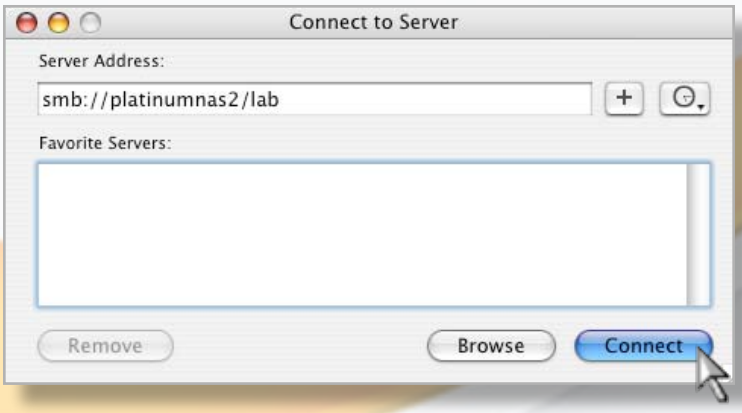
1.2 Mapping a Network Drive (OS-X)

The simplest method to locate and connect your MaxNAS to an OS-X workstation is by using the Finder Network browser.



If you can't locate the computer or server within the network browser, you may be able to find it by typing its network address in the Connect to Server dialog, accessible from the "Go" -> "Connect to Server" Finder menu option.

In the server address field, enter "smb://[MaxNAS]/[sharename]" where [MaxNAS] is the name or IP address of the MaxNAS, and [sharename] is a specific share being mapped, and click the "Connect" button.



If the share is not public a "SMB/CIFS File System Authentication" window appears. Enter an authorized User name and Password, and click OK.

Select a share and click OK. The selected share will appear on your desktop.

2. Using Webdisk

The MaxNAS provides a WebDisk function that allows you to access the system over the Internet from any browser.

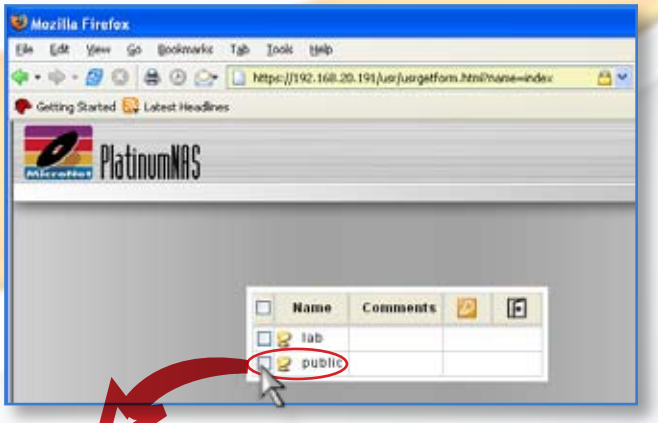
IMPORTANT: Make sure that WebDisk Support or Secure WebDisk Support is enabled in the Service Support screen in the system's Network menu. Please see chapter 3, section 3.3.2 for more information

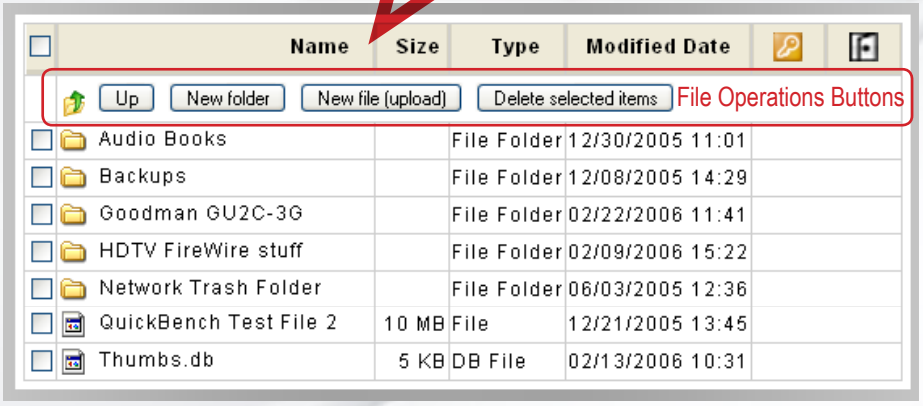
2.1 Logging In

Webdisk can operate normally (unsecured) or in secured mode. To access Webdisk normally, navigate to the MaxNAS home page in your web browser using http://[MaxNAS], where [MaxNAS] is either the WINS name or IP address of your MaxNAS. To access Webdisk securely, navigate to the MaxNAS home page in your web browser using https://[MaxNAS] where [MaxNAS] is either the Netbios name or IP address of your MaxNAS. In the Login page type in the assigned User ID and password previously created.

Note:
The When initially logging in to secure webdisk, you may see this dialog (illustrated right.) Accept the SSL certificate to allow access to the secure Webdisk. Accepting the certificate permanently will prevent this window from appearing in subsequent logins.

The WebDisk page will appear showing folders made currently available to you via the Access Control List (ACL) in the Folder item under Storage menu. Click on a folder name to enter the folder. The folder's page will appear, displaying files and folders.





2.2 The Webdisk control interface

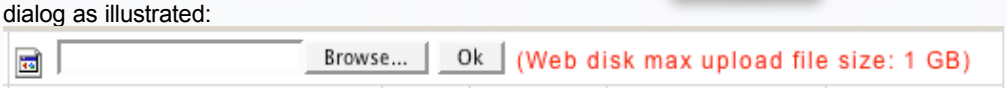
The webdisk interface consists of the following elements:

Name	Displays the names of folders and files.
Size	Shows the size of folders and files.
Type	Displays the type of folders and files.
Modified	Shows the time of most recent modification of folders and files.
	Change user password
	Logout from the webdisk session.

Files are accessible for download by clicking them.

2.3 File Operations

The file operations button bar is located undeneath the table header row. Buttons on the folder page allow you to create a new folder, upload files and delete files in the folder.

Up  Up	Goes to the previous folder level.
New Folder	Creates a new folder.
New File Upload	To upload a file from your computer to the current folder click New File Upload to activate the upload dialog as illustrated:  Click Browse and locate the file to upload. Click OK to upload the file to the current folder.
Delete Selected	Deletes selected files and folders. To select files for deletion, check the box next to each file to delete.

3. Using iSCSI

iSCSI allows two devices to negotiate and then exchange SCSI commands using IP networks. iSCSI takes a popular high-performance local storage bus and emulates it over wide-area networks, creating a storage area network (SAN). Unlike some SAN protocols, iSCSI requires no dedicated cabling; it can be run over existing switching and IP infrastructure. As a result, iSCSI is often seen as a low-cost alternative to Fibre Channel which requires dedicated infrastructure.

A Note about iSCSI performance
iSCSI performance is completely dependent on the Ethernet hardware (HBAs, switches, routers, and cabling at every hop between the MaxNAS and the initiator) network load, system load, and initiator computing power and load. For optimal results, use a dedicated network for iSCSI with jumbo frames enabled, low latency switches with jumbo frames and 802.3ad support, dual TCP Offload Engine NICs, and qualified gigabit Ethernet cabling throughout. Finally, iSCSI performance can be improved through separation of iSCSI traffic and ordinary Ethernet user traffic. Mixing traffic not only impairs SAN performance, but also creates a potential security risk since storage data is accessible on the user LAN. The most common means of separation is creating a new LAN segment physically separate from your LAN and keeping that segment isolated from other regular Ethernet segments. Alternatively, create a virtual LAN (VLAN) on your switch, limiting iSCSI traffic to the virtual LAN and keeping regular traffic out. Consult your network administrator for more information on best practices for your environment.

SIMULTANEOUS iSCSI VOLUME MAPPING ON MULTIPLE HOSTS
The MaxNAS can accept multiple host initiators simultaneously for clustering and SAN environments. Never attempt to mount the same volume on both channels without proper clustering software.

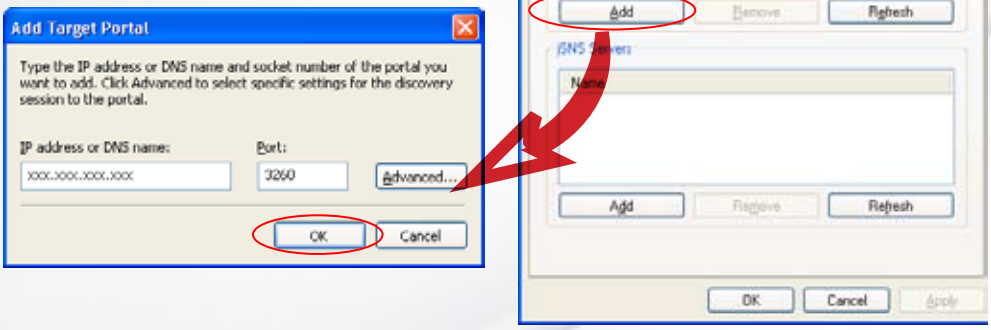
Mounting the same volume on both channels without proper software can result in data corruption or loss!

3.1 Microsoft Windows 2000 and newer

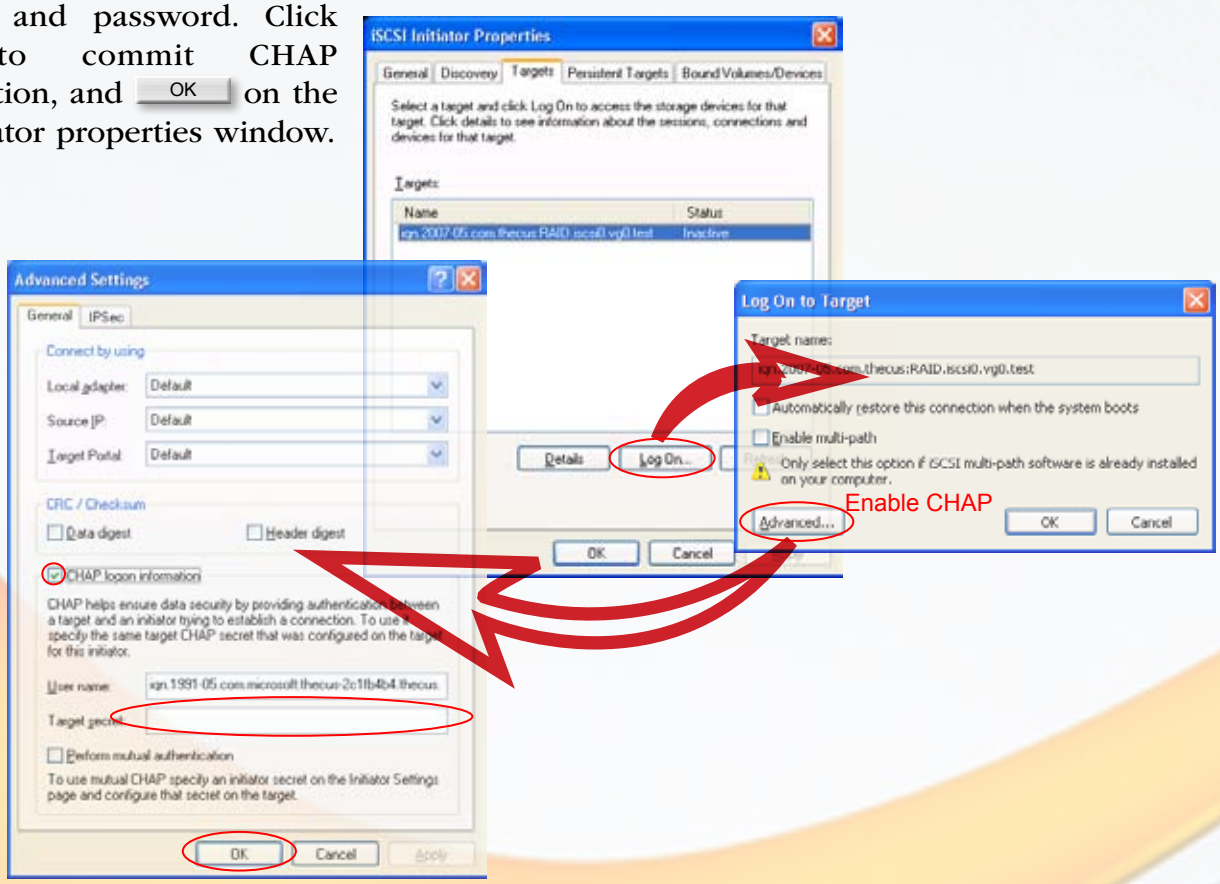
3.1.1 (Windows 2000/XP) Download and install the iSCSI Initiator from the Microsoft iSCSI technology site at http://www.microsoft.com/windowsserver2003/technologies/storage/iscsi/default.mspx

3.1.2 (All Versions) Start the iSCSI Initiator by double-clicking its icon on the desktop or start menu. The iSCSI Initiator properties window will appear.

3.1.3 Select the ***Discovery*** tab. Under **Target Portals**, click ***Add***. Enter the IP address or the netbios name of the MaxNAS Click OK.



3.1.4 On the **iSCSI Initiator Properties** window, select the ***Targets*** tab. With the iSCSI target highlighted, click Log On. The **Log On to Target** dialogue will appear. To enable a persistent connection, check the "Automatically restore this connection" checkbox. If you have not enabled CHAP authentication on the MaxNAS click OK. If you have enabled CHAP, click Advanced. Under Advanced Settings check the **CHAP login information** checkbox and enter your username and password. Click OK to commit CHAP authentication, and OK on the iSCSI Initiator properties window.

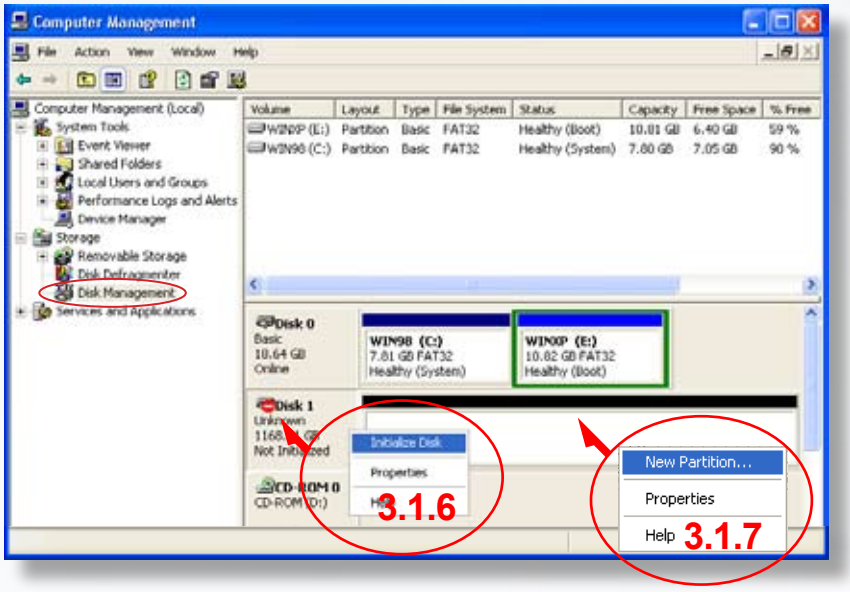


3.1.5. Open the disk management console. A list of the attached drives and their respective volumes will appear. Each Volume set will appear as an individual disk in the management console. Upon the first time the MaxNAS iSCSI volume is connected, an "Initialize and Convert Disk Wizard" should appear when the disk management console is run. You may use the Wizard to set up the volume or follow the next steps for manual configuration.

Note:
The Disk Management Console can be found under \Windows\System32\diskmgmt.msc on your system drive. For an illustrated guide, please see http://www.fantomdrives.com/support/faqs/hdfaqpc.php4#8

3.1.6 Right-click on the iSCSI volume. If it's not initialized a red "No Entry" logo will cover the disk icon. Right click on the disk and select "Initialize Disk." Follow the on-screen instructions.

3.1.7 Right click the initialized volume (The area right of the disk icon.) In the context menu select "New Partition." Follow the on screen instructions. In the File System pop-up menu, select NTFS. The default formatting option is Full format. A Quick format will take just a few minutes but will do less verifying of the drive than a full format. Click Start. Once the format process is complete your iSCSI volume is ready to use.



3.2 OS-X >10.4.10 Host Setup

The MaxNAS has been tested and qualified for use with the GlobalSAN initiator from Studio Network Solutions. It can be obtained from their web site at http://www.studionetworksolutions.com.

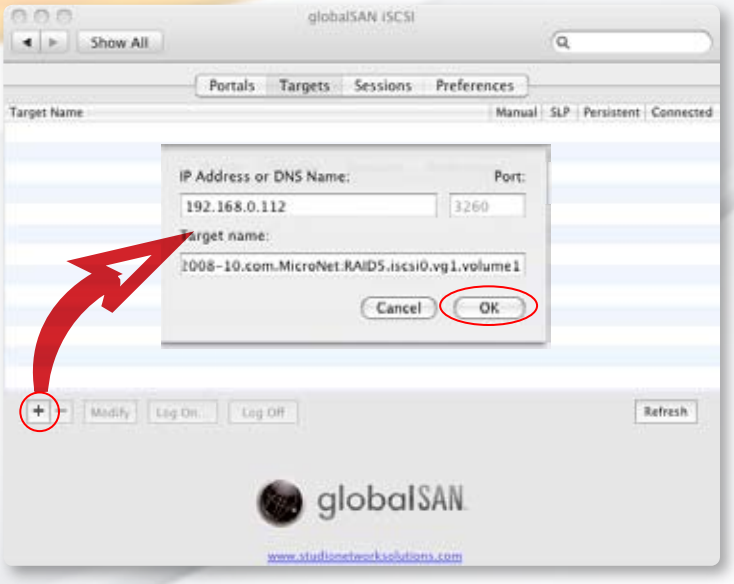
Before you begin please make sure you are logged in with administrative privileges. If you are unsure about your privilege level, please consult your Macintosh OS-X user manual or with your system administrator.

3.2.1 Download and install the GlobalSAN initiator. Follow the installation instructions provided on the website.

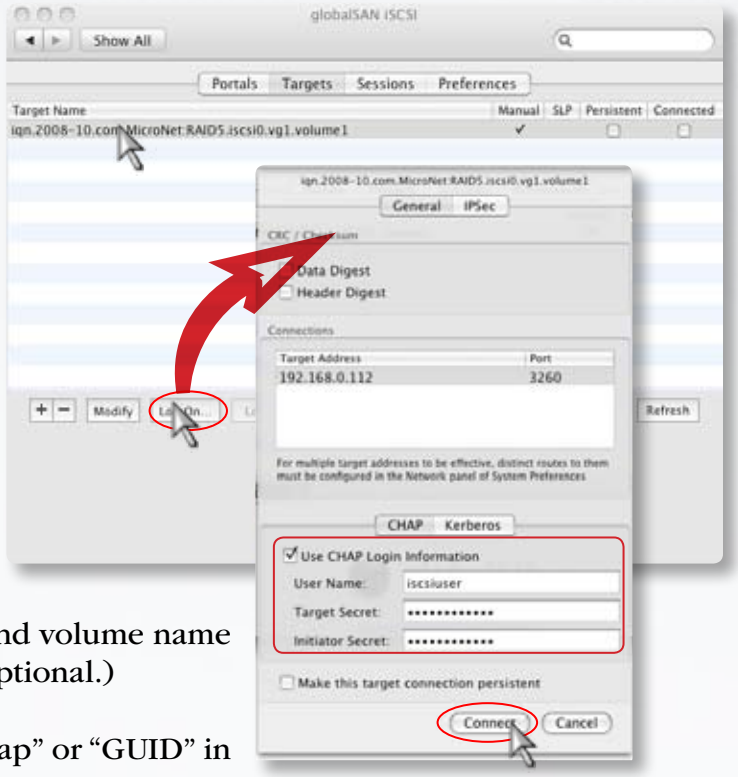
globalSAN iSCSI

3.2.2 Launch the globalSAN iSCSI initiator control from the System Preference Pane (/Applications/System Preferences.app)

3.2.3 Click + (illustrated below). In the IP Address entry box enter the IP address of the MaxNAS and the iSCSI Qualified Name (IQN) in the target name field. The IQN is listed in the MaxNAS iSCSI target page (see Chapter 3, section 2.2.6 for more information). Click OK to continue.



3.2.4 Select the MaxNAS IQN from the target list and click Log On. The iSCSI connection screen will appear. If you enabled CHAP, enter your CHAP username and password in the CHAP security area (ss illustrated). Click Connect to complete the operation.



3.2.5 Launch the "Disk Utility" application located under Applications/Utilities folder.

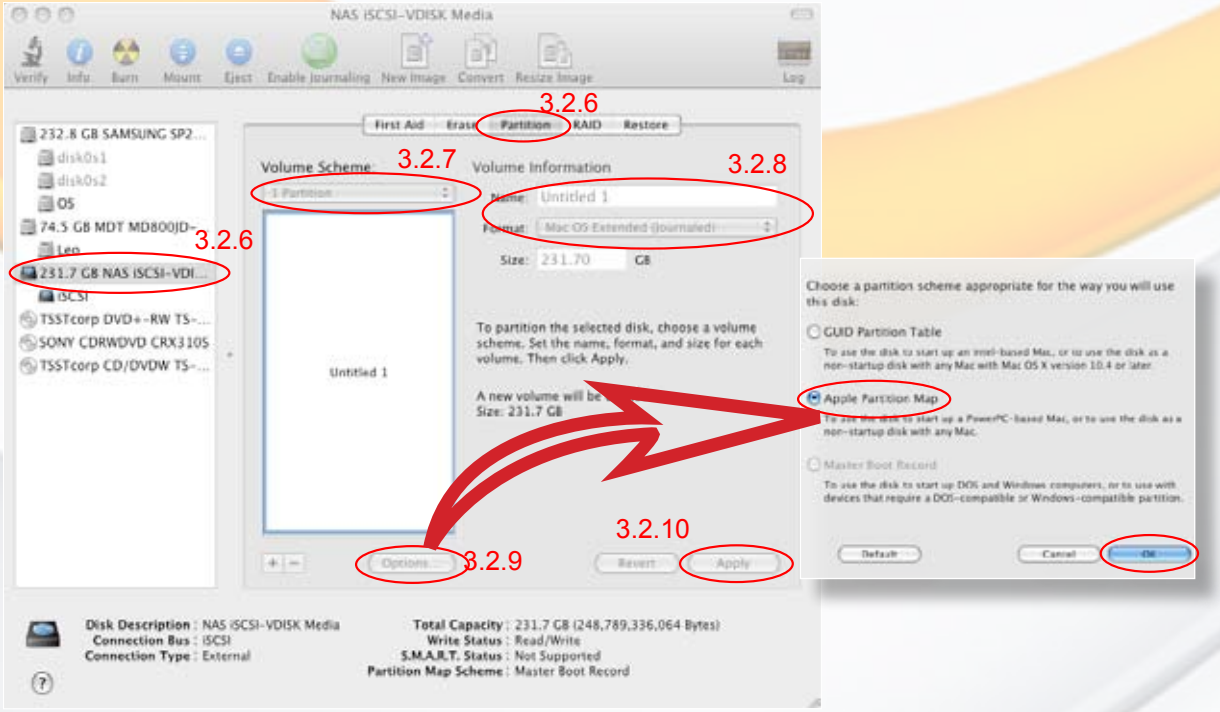
3.2.6 Highlight your new drive and select the "Partition" tab

3.2.7 Select the new partition map type.

3.2.8 Select the desired file system format and volume name for each partition in the volume scheme (optional.)

3.2.9 Click Options. Select "Apple Partition Map" or "GUID" in the dialog box and click OK.

3.2.10 Click Apply. Your MaxNAS iSCSI volume is ready to use!



4. File Backup With nSync

You can backup a share folder to another MaxNAS or MicroNet PlatinumRAID (Nsync target) or any FTP server. When using Nsync between Nsync devices, you have the option to transmit files securely. To backup files regularly, you can set up a scheduled synchronization task to run only once, daily, weekly, or monthly. You can also limit the bandwidth of your Nsync tasks, so other users on the network can share the bandwidth equally. To configure Nsync jobs, navigate to "Network" -> "Nsync." Below is a description of each field:

Item	Description
Task name	The name of your Nsync task.
Server	The IP address of your target server
Share folder	The share folder you would want to backup.
Last Time	The time when the last Nsync task was executed.
Last Status	The status of your last Nsync task.
Action	Administrator can run or stop an Nsync task by pressing the action button.
Bandwidth Setting	Bandwidth control on Nsync tasks.
Add	Click to add a Nsync task
Modify	Click to modify an Nsync task.
Restore	Restore share folder from an Nsync target.
Delete	Click to delete an Nsync task. Backup files on Nsync target is also deleted.

4.1 Adding an Nsync Task

From the **Nsync Information** screen, click ***Add*** to display the **Add Nsync Task** screen.

Item	Description
Task Name	The name of your Nsync task.
Manufacturer	Select whether the target is a Thecus Product (e.g. MaxNAS) or FTP server.
Target Server IP Address	The IP address of your target server.
Source Folder	The share folder you want to backup.
Nsync Task Name	The name of your Nsync task.
Authorized Username on Target Server	The account name on the target server.
Password on Target Server	The password for the username on the target server.
Test Connection	Click to check the connection to the Target Server.
Schedule	Schedule backup of your share folders.
Time	The time when the Nsync task will run.
Type	Select whether to run the Nsync task daily, weekly, or monthly. **Daily**: input the time of day to execute Nsync task. **Weekly**: input which day of the week to execute the task. **Monthly**: decide which day of the month to execute the task.
Apply	Click to submit the task.

4.2 Setting Up an Nsync Target on an Nsync Device

On the Nsync target server, the administrator of that server has to set up a user account with a folder named "nsync" and grant write access.

- On the Nsync server, add a user for Nsync source (ex. nsyncsource1). See Chapter 3, Section 4.2 for detailed instructions.
- On the Nsync server, grant that user (ex. nsyncsource1) write access to the **nsync** folder. See Chapter 3, Section 2.3 for detailed instructions.

The target server will start accepting Nsync tasks from server using that ID and password.

4.3 Setting Up an Nsync Target on Another Device

If you selected "Other Device" when setting up your Nsync task, the MaxNAS will use the FTP protocol to back up the share folder. On the external storage device, make sure there is a folder named "nsync", and the Auth ID has writable permission in that folder.

4.4 Designating MaxNAS or PlatinumRAID as an Nsync Target

The MaxNAS can act as an Nsync server, enabling another Nsync-equipped MicroNet NAS at a remote location backup their files to your MaxNAS. From the **Network** menu, choose the ***Nsync Target*** item, and the **Nsync Target Server Setting** screen appears. Enable the service and click OK.

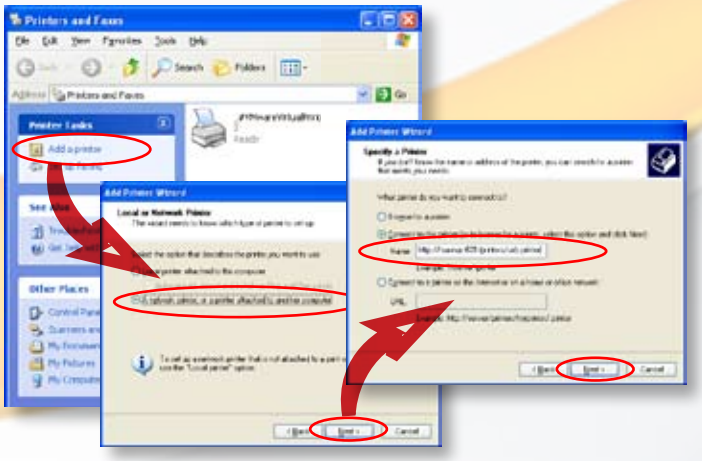
5. Connecting to MaxNAS Attached Printers

With a USB Printer attached, the MaxNAS can offer central network printing to all your networked computers.

IMPORTANT! Before you begin, please make sure the driver for your printer is properly installed on your computer. Please consult your printer manufacturer for up to date drivers for your host operating system

5.1 Windows XP SP2

To set up the Printer Server in Windows XP SP2, follow the steps below:

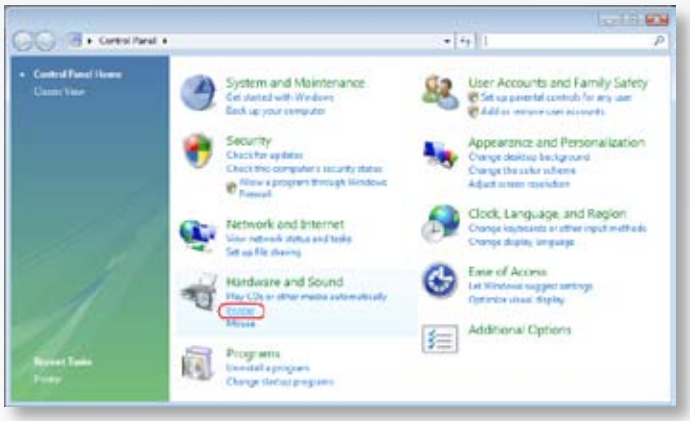


1. Go to Start > Printers and Faxes.
2. Click Add a printer.
3. The Add Printer Wizard appears on your screen. Click Next.
4. Select "A network printer, or a printer attached to another computer" option.
5. Select "Connect to a printer on the Internet or on a home or office network", and enter "`http://<MaxNAS>:631/printers/usb-printer` in the entry box, where `<MaxNAS>` is the IP address or Netbios name of the MaxNAS. Click Next.
6. Your Windows system will ask you to install drivers for your printer. Select correct driver for your printer.
7. Your Windows system will ask you if you want to set this printer as "Default Printer". Select Yes and all your print jobs will be submitted to this printer by default. Click Next.
8. Click Finish. Your printer is ready to use!

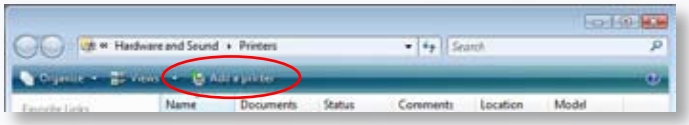
5.2 Windows Vista

To set up the Printer Server in Windows Vista, follow the steps below:

5.2.1 Open ***Printer Folder*** from the **Control Panel**.

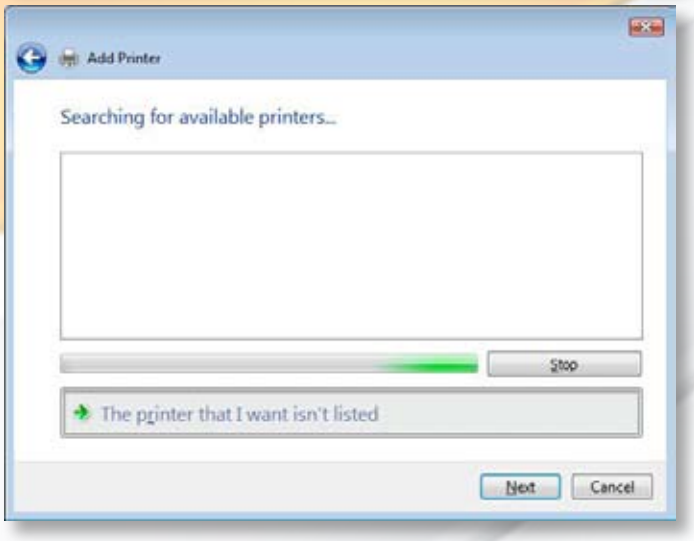


5.2.2 Click  .

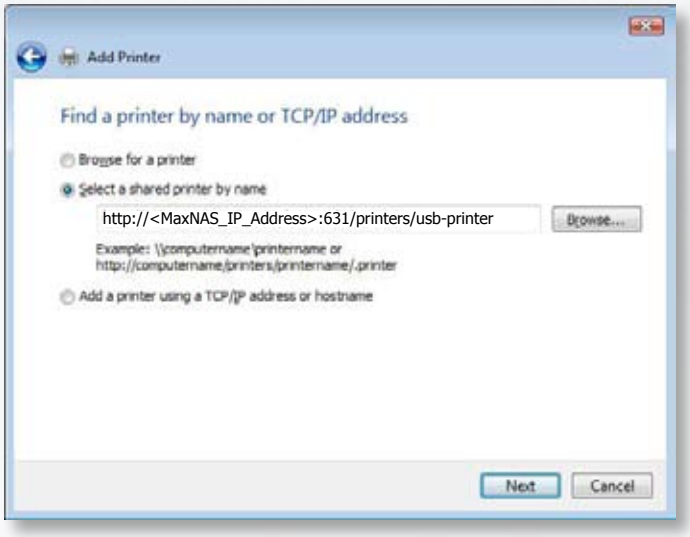


5.2.3 Select ***Add a network, wireless or Bluetooth printer***.

5.2.4 Select ***The printer that I want isn't listed***. You can press ***The printer that I want isn't listed*** to go into next page without waiting for **Searching for available printers** to finish.



5.2.5 Click ***Select a shared printer by name***. In the address entry box, type `http://<MaxNAS>:631/printers/usb-printer` in the box, where `<MaxNAS>` is the IP address or Netbios name of the MaxNAS. Click Next.



5.2.6 Select or install a printer click OK. You can choose to set this printer as the default printer by checking the ***Set as the default printer*** box. Click Next to continue.

Click Finish. Your printer is ready to use!

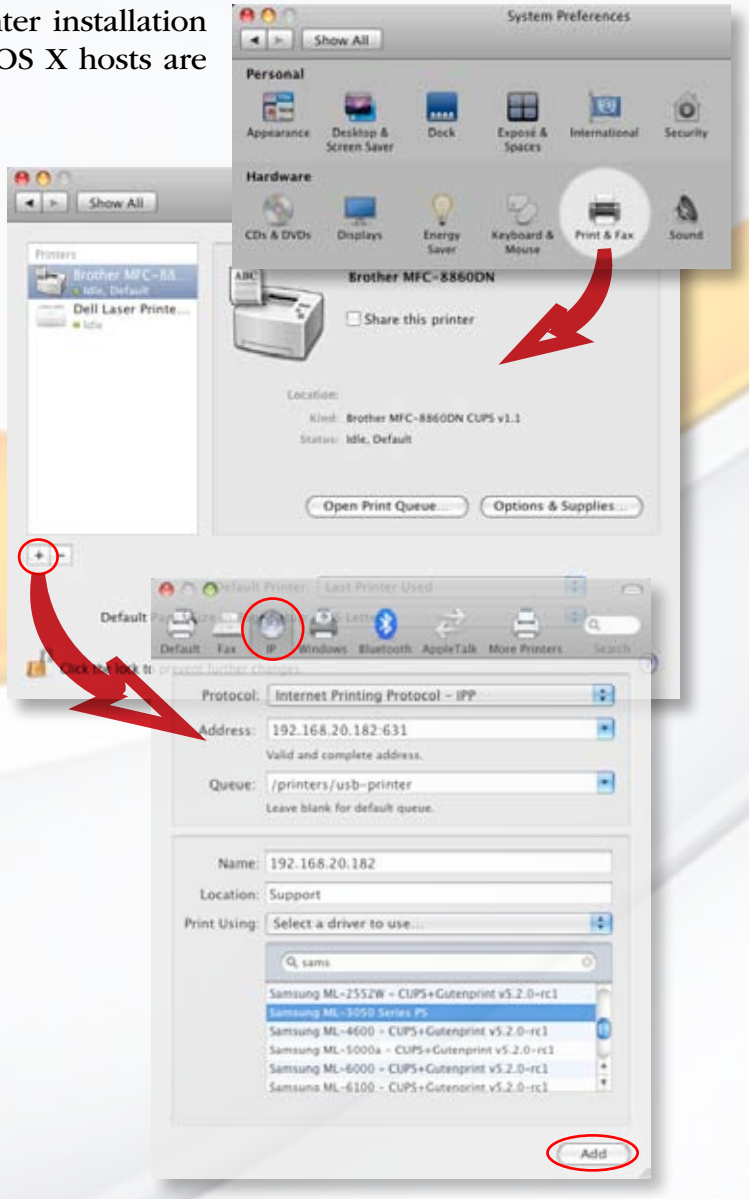
5.3 MacOS X

The following instructions are based on printer installation on a Mac OS X 10.5 based host. Other Mac OS X hosts are configured similarly.

5.3.1 Access the printer control panel, located in System Preferences.

5.3.2 Click the + in the "Print & Fax" control panel (illustrated right.)

5.3.3 In the Printer Browser that follows, Select the "IP" option (circled in the bottom illustration,) and enter the following values:



Protocol	Internet Printing Protocol - IPP
Address	[MaxNAS IP Address]:631
Queue	/printers/usb-printer
Name	User defined
Location	User defined
Print Using	Select your printer driver

5.3.4 Click Add to complete the installation. The printer is ready to use.

Chapter 5- Understanding RAID

The MaxNAS controller subsystem is a high-performance SATA drive bus disk array controller. When properly configured, the RAID subsystem can provide non-stop service with a high degree of fault tolerance through the use of RAID technology and advanced array management features.

The RAID subsystem can be configured to RAID levels 0, 1 (0+1), and 5. RAID levels other than 0 are able to tolerate a Hard Disk failure without impact on the existing data, and failed drive data can be reconstructed from the remaining data and parity drives. RAID configuration and monitoring can be done through the LCD front control panel or serial port. The MaxNAS features the following high availability functions:

- RAID Levels 0,1,5,6 and Span support
- Global Online Spare
- Automatic Drive Failure Detection
- Automatic Failed Drive Rebuilding
- Hot Spare Disk Drives
- Instant Availability/Background Initialization.

FYI:
The Berkeley RAID levels are a family of disk array data protection and mapping techniques described by Garth Gibson, Randy Katz, and David Patterson in papers written while they were performing research into I/O subsystems at the University of California at Berkeley. There are six Berkeley RAID Levels, usually referred to by the names RAID Level 1, etc., through RAID Level 6.

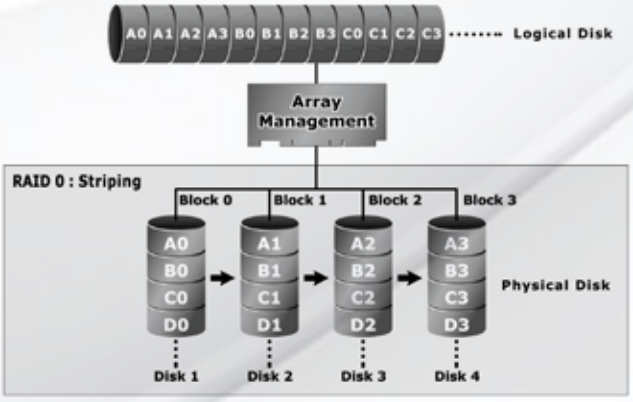
This section will help you gain understanding of how these functions can serve your needs best.

RAID

RAID is an acronym for Redundant Array of Independent Disks. It is an array of multiple independent hard disk drives that provide high performance and fault tolerance through support of several levels of the Berkeley RAID techniques. An appropriate RAID level is selected when the volume sets are defined or created, and is based on disk capacity, data availability (fault tolerance or redundancy), and disk performance considerations. The RAID subsystem controller makes the RAID implementation and the disks' physical configuration transparent to the host operating system, which means that the host operating system drivers and software utilities are not affected regardless of the RAID level selected.

RAID 0 (Striping)

This RAID algorithm writes data across multiple disk drives instead of just one disk drive. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array.

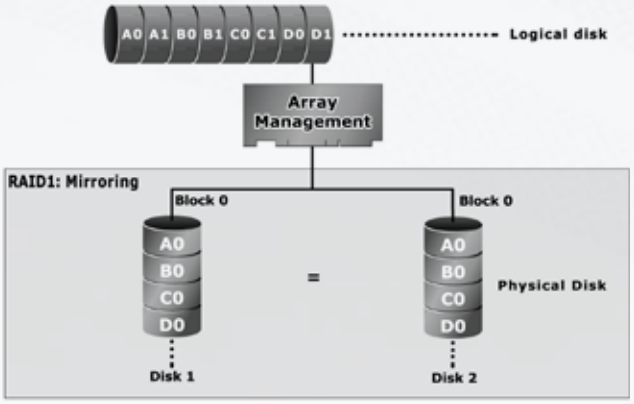


Pros: Disk striping enhances both read and write performance because multiple drives are accessed simultaneously,

Cons: The reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.

RAID 1 (Disk Mirroring)

RAID 1, also known as "disk mirroring", distributes duplicate data simultaneously to pairs of disk drives.

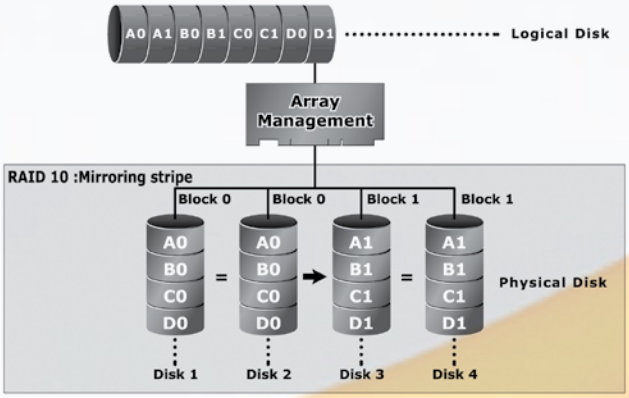


Pros: *RAID 1 offers extremely high data reliability as all the data is redundant. If one drive fails, all data (and software applications) are preserved on the other drive.*
Read performance may be enhanced as the array controller can access both members of a mirrored pair in parallel.

Cons: *RAID 1 volume requires double the raw data storage capacity*
Performance penalty when compared to writing to a single disk.

RAID 10

RAID 10 is a combination of RAID 0 and RAID 1, combing striping with disk mirroring. RAID Level 10 combines the fast performance of Level 0 with the data redundancy of Leve1 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are then duplicated to another set of drive for data protection. RAID 10 provides the highest read/write performance of any of the Hybrid RAID levels, but at the cost of doubling the required data storage capacity.

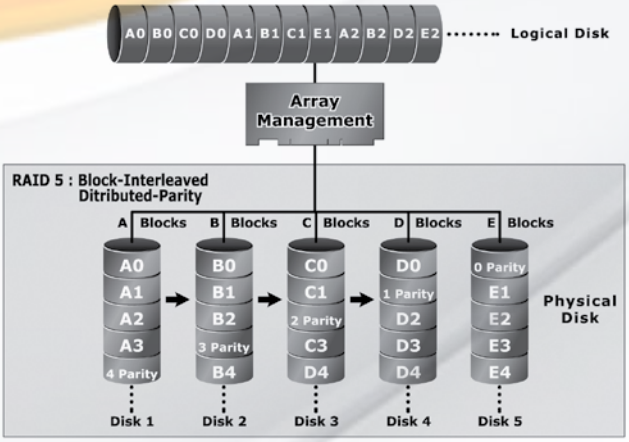


Pros: *Fastest read/write performance of any of the Hybrid RAID levels*
High data reliability as all the data is redundant

Cons: *Requires double the raw data storage capacity*

RAID 5

RAID 5 is sometimes called striping with parity at byte level. In RAID 5, the parity information is written to all of the drives in the subsystems rather than concentrated on a dedicated parity disk. If one drive in the system fails, the parity information can be used to reconstruct the data from that drive. All drives in the array system can be used to seek operation at the same time, greatly increasing the performance of the RAID system. RAID 5 is the most often implemented RAID algorithm in RAID arrays.

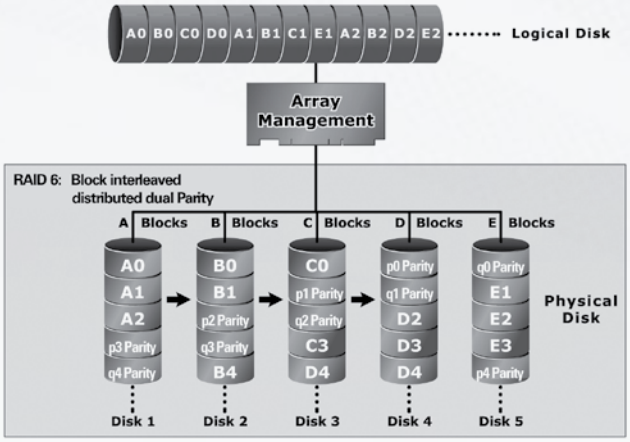


Pros: *Very good general transfer performance*
Fault tolerant

Cons: *Can be slow at large size file transfers*

RAID 6

Also known as dual parity, RAID 6 is similar to RAID 5, but offers double the fault tolerance by performing two parity computations on overlapping subsets of the data. RAID 6 offers fault tolerance greater that RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data. RAID 6 is an extension of RAID 5 that uses a second independent distributed parity scheme. Data is striped on a block level across a set of drives, and then a second set of parity is calculated and written across all of the drives.



Pros: *Very good general transfer performance*
Fault tolerant
Cons: *Can be slow at large size file transfers*

Hot Swappable Disk support

Your MaxNAS has a built in protection circuit to support replacement of disk drives without having to shut down or reboot the RAID. In case of drive failure, the failed drive can be removed from the MaxNAS and replaced with a new drive without disrupting dataflow to the host computer.

Hot Spare Drives

A hot spare drive is an unused online available drive, which is ready for replacing a failed disk drive. In a RAID level 1 or 5 RAID set, any unused online available drive installed but not belonging to a RAID set can be defined as a hot spare drive. Hot spares permit you to replace failed drives automatically without powering down your MaxNAS. When your MaxNAS detects a drive failure, the system will automatically and transparently rebuild using any available hot spare drive(s). The RAID set will be reconfigured and rebuilt in background, while the RAID subsystem continues to handle system requests. During the automatic rebuild process, system activity will continue as normal, but system performance and fault tolerance will be affected.

Hot-Swap Disk Rebuild

A Hot-Swap function can be used to rebuild disk drives in arrays with data redundancy such as RAID level 1(0+1), 3, and 5. If a hot spare is not available at time of drive failure, the failed disk drive must be replaced with a new disk drive so that the data on the failed drive can be rebuilt. If a hot spare is available, the rebuild starts automatically when a drive fails. The RAID subsystem automatically and transparently rebuilds failed drives in the background with user-definable rebuild rates. The RAID subsystem will automatically restart the system and the rebuild if the system is shut down or powered off abnormally during a reconstruction procedure condition. Please note that the system may no longer be fault tolerant during degraded operation or the rebuild process- Fault tolerance will be lost until the damaged drive is replaced and the rebuild operation is completed.

Chapter 6- Troubleshooting

Daily Use Tips

- Read this User's Guide carefully. Follow the correct procedure when setting up the device.
- Additional application software may have been included with your drive. Please review the documentation included with this software for information on the operation and support of this software. The documentation can usually be found in an electronic format on the included CD.
- Always operate your drive on a steady, level surface. Do not move the unit while it is turned on.
- Plug your drive into a grounded electrical outlet. The use of "ground-defeating" adapters will cause damage not covered by your warranty.
- Do not open your MaxNAS or attempt to disassemble or modify it. Never insert any metallic object into the drive to avoid any risk of electrical shock, fire, short-circuiting or dangerous emissions. If it appears to be malfunctioning, please contact MicroNet Support.
- Do not power off the MaxNAS from the power button, as it may cause data loss.

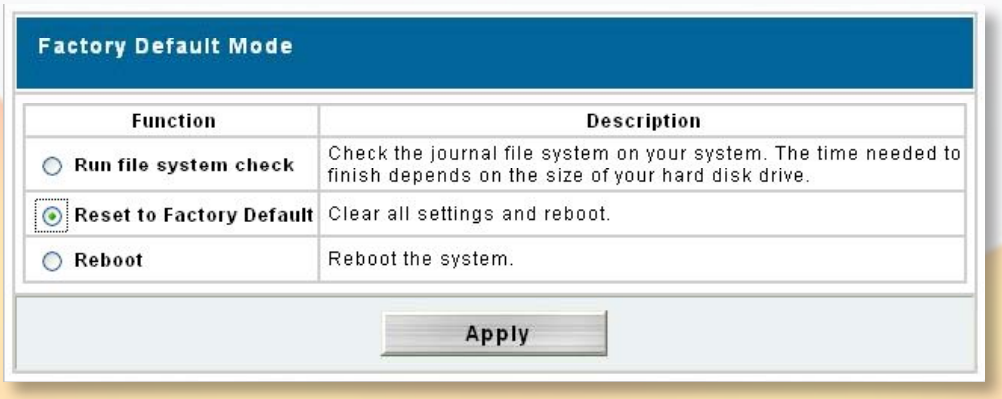
General Use Precautions

- Do not expose the MaxNAS to temperatures outside the range of 5°C (41°F) to 45°C (104°F). Doing so may damage the drive or disfigure its casing. Avoid placing your drive near a source of heat or exposing it to sunlight (even through a window.)
- Never expose your device to rain, or use it near water, or in damp or wet conditions. Doing so increases the risk of electrical shock, short-circuiting, fire or personal injury.
- Always unplug the hard drive from the electrical outlet if there is a risk of lightning or if it will be unused for an extended period of time.
- Don't place the drive near sources of magnetic interference, such as computer displays, televisions or speakers. Magnetic interference can affect the operation and stability of your MaxNAS.
- Do not place heavy objects on top of the drive or use excessive force on it.
- Never use benzene, paint thinners, detergent or other chemical products to clean the outside of the MaxNAS. Instead, use a soft, dry cloth to wipe the device.

Resetting the MaxNAS

Should the MaxNAS become inaccessible (blinking fault light, forgotten password) or if directed by MicroNet support, please follow the below procedure to reset the MaxNAS to factory default:

1. If the unit is functioning, ping the MaxNAS from the host to obtain its IP address. Write down the IP address.
2. Shut down the MaxNAS and disconnect the Ethernet cable(s)
3. Power on the MaxNAS and immediately press hold the recessed reset button (circled right) with a paper clip.
4. Continue to hold the reset button until the MaxNAS emits a loud beep (approximately 2 minutes).
6. Plug the Ethernet cable back into LAN port 1.
7. Navigate your Explorer or browser window to HTTP://XXX.XXX.XXX.XXX (where the X's represent the MaxNAS's IP address.)
8. You will see a simple dialog box that has three options:



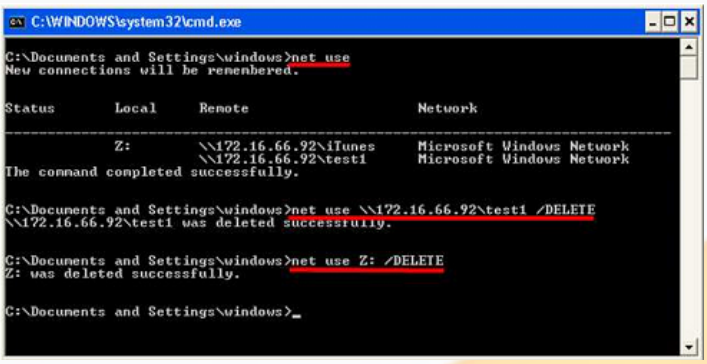
   Choose Reset to Factory Default and click Apply. Click Yes in the confirmation dialog box.
9. You should see a confirmation dialog pop up telling you that the MaxNAS is reset. Reboot the MaxNAS to complete the procedure.

Frequently Asked Questions

Q: I Forgot the Login or Password
A: If you forget your network IP address or your password, you can reset the MaxNAS to its default settings. Please see "Resetting your MaxNAS" in the troubleshooting section.

Q: I forgot my IP Address/I can't find the MaxNAS on the network!
A: The current IP Address for both LAN1 and LAN2 will be displayed on the LCD screen. If you do not have physical access to the MaxNAS, you may use the MaxNAS Setup wizard on the MaxNAS product CD. You may also download the wizard from MicroNet's support site at www.micronet.com/support

Q: I'm having trouble map a network share in Windows
A: Windows only allows connection to a network resource using a single set of user credentials. The network resource you are trying to acces may have already been accessed using a different user name and password. To connect using a different user name and password, first disconnect any existing mappings to this network share. To check out existing network connections, open a command prompt and type "`net use`"; You may then disconnect the sessions by typing



"`net use <session> /DELETE`"

where <session> is the session revealed above (illustrated right.) Alternatively, the most sure way to clear all existing network connection is to log out and back in to your Windows session.

Q: There is a fault light and/or the buzzer is beeping!
A: Do not turn off or reset the unit! Follow these steps to identify and correct the alarm:

1. Refer to Chapter 1, Section 7 to identify the alert., and login to the MaxNAS administration user interface.
2. Go to the System menu and choose Logs item.
3. The System Log screen appears.
4. Click the Error button and all recorded errors appear. The log entries will help you diagnose the problem. If there is a failed hard drive, see Chapter 1, section 8- "Replace Hard Drives"
5. If you are unable to solve the problem, please contact MicroNet Support.

Q: Can I increase my MaxNAS's volume capacity?
A: Larger drive modules may be available for your Model. Consult your MicroNet reseller for more information.

Q: Can I have more than one MaxNAS in the network?
A: Yes. Please call MicroNet Help Desk if you have questions about your particular configuration.

Q: What is the warranty period for MaxNAS?
A: MaxNAS standard warranty is One-year limited. Optional extended warranty and overnight exchange programs are available, consult your MicroNet dealer or visit www.MicroNet.com for additional information.

Q: My Stackable Share is empty! Where's my data?
A: The connectivity between the MaxNAS and the iSCSI target shared may have been disrupted, and has not been re-established automatically. Ensure that the target iSCSI device is online and accessible, and perform reconnected as described in Chapter 3, Section 2.5.5.

Q: I have my MaxNAS configured as a RAID5, which means it can sustain a disk failure. This means I don't need to worry about backing up my data, right?
A: Although RAID5 does provide tolerance for disk failure, it does not prevent damage due to fire, flood, or other types of disaster, nor can it prevent virus damage or accidental deletion. **ALWAYS BACK UP YOUR DATA.**

Appendix A: Getting Help

If you experience problems with your MaxNAS, please contact your Authorized MicroNet Reseller for assistance. If the reseller is unable to resolve your issue, please contact MicroNet's Help Desk for assistance. Please have the model, serial number, date of purchase, and reseller's name available before making contact. If possible, call from a telephone near the system so we can direct you in any necessary system corrections.

How To Contact MicroNet Technology, Inc.

Mail: MicroNet Technology, Inc.
19260 Van Ness Avenus
Torrance, CA 90501
Phone: (310) 320-0772 Help Desk & Customer Service
Web: http://www.MicroNet.com/help
email: support@MicroNet.com

Appendix B: RAID Level Comparison Table

RAID Level	Description	Min. Drives	Max. Drives	Capacity	Data Reliability	Data Transfer Rate	I/O Request Rates
Span	Also known as disk spanning. Data is distributed sequentially to all drives. There is no data protection.	1	4	(N) Disks	No data protection	Same as a single disk	same as a single disk
0	Also known as striping Data distributed across multiple drives in the array simultaneously. There is no data protection	1	4	(N) Disks	No data Protection	Very High	Very High for Both Reads and Writes
1	Also known as mirroring All data replicated on N Separated disks. N is always a multiple of 2. This is a high availability Solution, but due to the 100% data duplication, it is also a costly solution.	2	4	1/(N) Disks	Lower than RAID 6, Higher than RAID 5	Reads are higher Than a single disk; Writes similar to a sin-gle disk	Reads are twice faster than a single disk; Write are similar to a single disk.
10	Also known as striped mirroring. Data and parity information is subdivided and distributed across all disks. This is a high availability Solution, but due to the 100% data duplication, it is also a costly solution.	4	4	1/2 (N) Disks	Lower than RAID 6, higher than RAID 5	Reads are similar to RAID 0 Writes are similar to single disk	Reads are similar to RAID 0 Writes are similar to sin-gle disk
5	Also known Block-Interleaved distributed Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	3	5	(N-1) Disks	Lower than RAID 1, 10 Higher than a single drive	Reads are similar to RAID 0; Writes are slower than RAID 0	Reads are similar to RAID 0; Writes are slower than a single disk.
6	Also known as dual parity. Similar to RAID 5, but does two different parity computations or the same computation on overlapping subsets of the data. The RAID 6 can offer fault tolerance greater that RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data reliability similar to RAID 0.	4	5	(N-2 Disks)	Highest Reliability	Reads are similar to RAID 0; Writes are slower than RAID 5	Reads are similar to RAID 0; Writes are slower than a single disk.

Appendix C: Active Directory

With Windows 2000, Microsoft introduced Active Directory (ADS), which is a large database/ information store. Prior to Active Directory the Windows OS could not store additional information in its domain database. Active Directory also solved the problem of locating resources; which previously relied on Network Neighborhood, and was slow. Managing users and groups were among other issues Active Directory solved.

What is Active Directory?
Active Directory was built as a scalable, extensible directory service that was designed to meet corporate needs. A repository for storing user information, accounts, passwords, printers, computers, network information and other data, Microsoft calls Active Directory a “namespace” where names can be resolved.

ADS Benefits
ADS lets the MaxNAS easily integrate with the existing ADS in an office environment. This means the MaxNAS is able to recognize your office users and passwords already on the ADS server, and allow the network administrator to seamlessly control the MaxNAS as another network resource. This feature significantly lowers the overhead of the system administrator. For example, corporate security policies and user privileges on an ADS server can be enforced automatically on the MaxNAS.

IMPORTANT: the MaxNAS respects active directory users and groups only for purposes of initial access. User ACLs will only propagate for the writing account.

Appendix D: Supported UPS List

The MaxNAS can support UPS communication with the following UPS communication protocols:

SEC protocol
Generic RUPS model
Generic RUPS 2000 (Megatec M2501 cable)
PhoenixTec protocol
Safenet software

The following Models have been tested and approved for compatibility:

Brand	Series	Model	Notes
Ablerex	MS-RT		
ActivePower	1400VA		
AEC	MiniGuard UPS 700 M2501 cable		
APC	Back-UPS Pro		
	Matrix-UPS		
	Smart-UPS		
	Back-UPS	940-0095A/C cables, 940-0020B/C cables, 940-0023A cable	
	Back-UPS Office	940-0119A cable	
	Masterswitch Not a UPS - 940-0020 cable		
	Back-UPS RS 500 custom non-USB cable		
Belkin	Regulator Pro serial		
	Resource		
	Home Office	F6H350-SER, F6H500-SER, F6H650-SER	
	Universal UPS	F6C800-UNV, F6C120-UNV, F6C1100-UNV, F6H500ukUNV	
Best Power	Fortress (newer)		
	Fortress Telecom		
	Axxium Rackmount		
	Patriot Pro		
	Patriot Pro II		
	Patriot INT51 cable		
	Micro-Ferrups		
	Fortress/Ferrups f-command support		
Centralion	Blazer		
Clary	ST-800		
Compaq	T1500h		
Cyber Power Systems		320AVR, 500AVR, 650AVR, 700AVR, 800AVR 850AVR, 900AVR, 1250AVR,. 1500AVR, Power99 550SL, 725SL, CPS825VA, 1100AVR, 1500AVR-HO	
Deltec	PowerRite Pro II		
Dynex	975AVR		
Effekta	MI/MT/MH 2502 cable		
Energy Sistem	(various)		
ETA	mini+UPS WinNT/Upsoft cable		
ETA	mini+UPS PRO UPS Explorer cable		
Ever UPS	NET *-DPC		
	AP *-PRO		
Ever-Power	625/1000		
Exide	NetUPS SE		

Brand	Series	Model	Notes
Fenton Technologies	PowerPal P-series		
	PowerPal L-series		
	PowerOn		
	PowerPure		
Fairstone		L525/L625/L750	
Fideltronik	Ares 700 and larger		
	Other Ares models		
Fiskars	PowerRite MAX		
	PowerServer	10, 30	
Gamatronic	All models with alarm interface		
	MP110/210		
	MS-T		
	MS		
	µPS3/1		
Gemini	UPS625/UPS1000		
HP	R3000 XR		
	R5500 XR		
INELT	Monolith 1000LT		
Infosec	iPEL	350, 500, 750, 1000	
Ippon	(various)		
Liebert	UPStation GXT2 contact-closure cable		
Masterguard	(various)		
Meta System	HF Line	1..4 boards, /2 5..8 boards	
	HF Millennium	810, 820	
	HF TOP Line	910, 920, 930, 940, 950, 960, 970, 980	
	ECO Network	750, M1000, M1050, M1500, M1800 M2000, M2100, M2500, M3000	
	ECO	305, 308, 311, 511, 516, 519, 522	
	ally HF	800, 1000, 1250, 1600, 2000, 2500	
	Megaline	1250, 2500, 3750, 5000, 6250, 7500, 8750, 10000	
MGE UPS SYSTEMS	NOVA AVR 600 Serial		
	NOVA AVR 1100 Serial		
	Pulsar Ellipse	USBS Serial cable, S, Premium USBS Serial cable, Premium S	
	Ellipse Office	600 Serial cable, 750 Serial cable, 1000 Serial cable, 1500 Serial cable	
	Pulsar EXtreme C / EX RT		
	Comet EX RT	Serial port, 3:1 Serial port	
	Pulsar Esprit		
	Evolution S	1250, 1750, 2500, 3000	Serial Port
	Pulsar M	2200, 3000, 3000 XL	Serial Port
	Pulsar	700, 1000, 1500, 1000 RT2U, 1500 RT2U, MX 4000 RT, MX 5000 RT Evolution, EXtreme C, ES+, ESV+, SV, ESV, EX, EXL, PSX, SX, Extreme	Serial Port
	Comet EXtreme		
	Comet / Galaxy (Serial)	Utalk Serial Card (ref 66060), HID COM Serial Card (ref 66066)	
MicroDowell	B.Box BP	500, 750, 1000, 1500	
Microsol	Solis	1.0 1000VA, 1.5 1500VA, 2.0 2000VA, 3.0 3000VA	
	Rhino	6.0 6000VA, 7.5 7500VA, 10.0 10000VA, 20.0 20000VA	
Mustek	Various		
	Powermust	400VA Plus, 600VA Plus, 800VA Pro 1000VA Plus, 1400VA Plus, 2000VA USB	
Nitram	Elite	500, 2002	
Oneac	EG/ON Series advanced interface		
Online	P-Series		
OnLite	AQUA 50		

Brand	Series	Model	Notes
Orvaldi	various not 400 or 600		
Powercom	SMK-800A		
	ULT-1000		
	TrustTrust 425/625		
Powercom	BNT-1000AP		
	Advice Partner/King Pr750		
	BNT-2000AP		
PowerGuard	PG-600		
PowerKinetics	9001		
PowerTech	Comp1000 DTR cable power		
Power Walker	Line-Interactive VI1000		
Powerware		3110, 3115, 5119, 5125, 5119 RM, PW5115 PW5125PW9120, PW9125, 9120, 9150, 9305	
Powerwell	PM525A/-625A/-800A/-1000A/-1250A		
Repotec	RPF525/625/800/1000		
	RPT-800A		
	RPT-162A		
SMS (Brazil)	Manager III		
SOLA		325, 520, 610, 620, 330	
SOLA/BASIC Mexico	various ISBMEX protocol		
Socomec Sicon	Egys 420 VA		
Soltec	Winmate 525/625/800/1000		
Soyntec	Sekury C	500, 800	
SquareOne Power	QP1000		
SuperPower	HP360, Hope-550		
Sweex	500/1000 smart - shipped with SafeNet		
	500/1000 contact closure - shipped with UPSmart		
	BC100060 800VA		
Sysgration	UPGUARDS Pro650		
Tecnoware	Easy Power 1200		
Tripp-Lite	SmartUPS		
	SmartOnline		
	(various) Lan 2.2 interface - black 73-0844 cable		
Trust	UPS 1000 Management PW-4105		
UNITEK	Alpha	500 IC, 1000is, 500 ipE	
UPSonic	LAN Saver 600		
	Power Guardian		
Victron/IMV	(various)		
	Lite crack cable		

Appendix E: Glossary

Active Directory an implementation of LDAP directory services by Microsoft for use in Windows environments. Active Directory allows administrators to assign enterprise wide policies, deploy programs to many computers, and apply critical updates to an entire organization. An Active Directory stores information and settings relating to an organization in a central, organized, accessible database. Active Directory networks can vary from a small installation with a few hundred objects, to a large installation with millions of objects. Active Directory was released first with Windows 2000.

ATA Acronym for "AT Bus Attachment" - a standard interface to IDE hard disks. Western Digital's IDE disk interface was standardized by ANSI to form the ATA specification using a 16-bit ISA bus.

Cache cache is a fast-access memory bank that serves as an intermediate storage for data that is read from or written to secondary storage. Typically, high-speed caches are implemented in RAM, though they can also be implemented on disk when speed is not a critical requirement. Caches generally improve the efficiency of read operations due to the principles of "spatial and temporal locality of data". They can also improve the efficiency of write operations. See also: Write Back Cache, Write Through Cache

Common Internet File System (CIFS) a network protocol for sharing files, printers, serial ports, and other communications between computers. CIFS is based on the widely-used SMB protocol.

Degraded Mode All RAID schemes with the exception of RAID 0 are designed to handle disk failures. However, there is limit on the number of hard disks that can fail before the array is rendered inoperative. For instance, this limit value is 1 for RAID 1, 3, and 5. In the case of RAID 10 or 50, the upper bound is equal to the number of parity groups. When the number of disk failures occurring in an array are less than or equal to this upper bound, the array is denoted to be in a degraded state. The failure of the disks does not impair reading from or writing to the array. However, it impairs the efficiency of throughput in all RAID types (with the exception of RAID 1) since data requested by read operations may have to be "reconstructed" using parity. In the case of RAID 1 the throughput of read operations is cut in half if a drive fails. Operating in degraded mode is considered an acceptable alternative only for short durations. Generally this duration should span no more time than that required to inform the user of the failures and to replace the failed disks with suitable spares.

Device Driver A piece of software that controls a hardware device. Typically drivers provide an interface by which applications can use the device in a uniform and hardware-independent manner.

Dirty Data data that has been written to a cache but has not been "flushed," or written to its final destination, typically some secondary storage device.

Disk Array A Disk Array is a logical disk comprised of multiple physical hard disks. The number of hard disks in an disk array is dictated by the type of the array and the number of spares that may be assigned to it. Furthermore, whether a disk array can be built using part of the space on a disk (as opposed to being forced to use the whole disk) depends upon the implementation. Disk Arrays are typically used to provide data redundancy and/or enhanced I/O performance.

Disk Block Data is stored on disks in blocks that are generally of a predefined size. This size is typically a value such as 512 bytes, 1 KB, 2 KB, etc. When a record is written to a disk, the blocks used for that record are dedicated to storing the data for that record only. In other words two records are not permitted to share a block. Consequently, a block may be only partially used. For instance, assume a disk has a block size of 1 KB and a user record written to it has a size of 3148 bytes. This implies that the user record will be written into 4 blocks, with the contents of one of the blocks being only partially filled with (3148 – 3072) 76 bytes of data.

DNS (Domain Name Server) A system that stores information associated with domain names in a distributed database on networks, such as the Internet. The domain name system (domain name server) associates many types of information with domain names, but most importantly, it provides the IP address associated with the domain name. It also lists mail exchange servers accepting e-mail for each domain. In providing a worldwide keyword-based redirection service, DNS is an essential component of contemporary Internet use.

Dynamic Host Configuration Protocol (DHCP) a client-server networking protocol. A DHCP server provides configuration parameters specific to the DHCP client host requesting, generally, information required by the client host to participate on an IP network. DHCP also provides a mechanism for allocation of IP addresses to client hosts. DHCP emerged as a standard protocol in October 1993.

Ethernet A local-area network standard that is currently the most prevalent with an estimated 80% of desktops connected using this standard. It was developed jointly by Xerox, DEC and Intel and employs a bus or star topology.

File System A file system is a layer between applications and the disks to which their I/O is directed. File systems serve to hide the details of the physical layout of files on the disk, allowing applications to address files as a contiguous logical area on disk accessible by a name regardless of their physical location on the storage device.

FTP (File Transfer Protocol) is a commonly used, open standard protocol for exchanging files over any network that supports the TCP/IP protocol (such as the Internet or an intranet). Virtually every computer platform supports the FTP protocol. This allows any computer connected to a TCP/IP based network to manipulate files on another computer on that network regardless of which operating systems are involved (if the computers permit FTP access.) There are many existing FTP client and server programs, and many of these are free.

Hot Spare One or more disks in a RAID array may fail at any given time. In fact, all RAID types with the exception of RAID 0 provide methods to reconstruct the array in the event of such an occurrence. A commonly used tactic is to earmark a hard disk that is not being used

by any RAID array as a backup. In the event a hard disk in a RAID array fails, this backup is automatically mobilized by the RAID controller to step in place of the failed hard disk. The data in the failed hard disk is "reconstructed" and written into the new hard disk. In the case of a RAID 1, data is reconstructed by simply copying the contents of the surviving disk into the spare. In the case of all other RAID types, reconstruction is performed using parity information in the working hard disks of that RAID array. This backup hard disk is known as a "hot" spare since the fail-over process is performed dynamically on a server within the same session i.e., without the necessity for re-booting or powering down.

IDE Acronym for "Integrated Device Electronics". A hard disk drive interface standard developed by Western Digital and introduced. Also knows as Parallel ATA.

IEEE 802.3ad Link Aggregation a method for using multiple Ethernet network cables/ports in parallel to increase the link speed beyond the limits of any one single cable or port, and to increase the redundancy for higher availability. The following modes of operation are available:

- Failover: When one port fails, the other one will take over.
- Load Balance: Ethernet traffic will flow along both Ethernet ports.
- 802.3ad: Linkage two Ethernet ports in parallel to increase throughput.

Logical Drive A logical drive is comprised of spaces from one or more physical disks and presented to the operating system as if it were one disk.

iSCSI ("Internet SCSI") a protocol allowing clients (called initiators) to send SCSI commands (CDBs) to SCSI storage devices (targets) on remote servers. It is a popular Storage Area Network (SAN) protocol.

MAC (Media Access Control) Address In computer networking a Media Access Control address (MAC address) is a unique identifier attached to most forms of networking equipment. All Ethernet devices have unique MAC addresses.

NFS (Network File System) a network file system protocol originally developed by Sun Microsystems in 1983, allowing a user on a client computer to access files over a network as easily as if the network devices were attached to its local disks. NFS, like many other protocols, builds on the Open Network Computing Remote Procedure Call (ONC RPC) system. The Network File System protocol is specified in RFC 1094, RFC 1813, and RFC 3530
Online Capacity Expansion The ability to add space to an existing RAID array within a session while preserving the RAID type and data within the array is known as online capacity expansion. The availability of this feature enables the user to add space to a RAID array as and when required without rebooting, thereby obviating the need for precise forecasts of capacity requirements for the future.

Parity A mathematical function that serves as a method for error verification and correction. In strict technical terms the parity of a group is set to 1 if the number of bits in the group that are set to 1 is odd, and 0 otherwise. For instance, the parity of N bytes of data is obtained by determining the number of ith bits in the N bytes that are set to 1. If that number is odd, then the ith bit of the result is set to 1. This may sound complicated, but in reality the result can

be obtained by simply evaluating the XOR of the N bytes. Parity allows one error in a group (of bytes) to be corrected.

Partition The space contributed to each array on a physical drive is referred to as a partition.

PCI An acronym for "Peripheral Component Interconnect". It is Intel's local bus standard that supports up to four plug-in PCI cards per bus. Since PCs can have two or more PCI buses, the number of PCI cards they can support are a multiple of four. The current PCI bus implementation (version 2.2) incorporates two 64-bit slots at 66 MHz. Consequently, the highest throughput achievable using such a bus is 528 MB/sec.

PCI Express (Peripheral Component Interconnect Express) officially abbreviated as PCI-E or PCIe, is a computer host bus interface format introduced by Intel in 2004. PCI Express was designed to replace the general-purpose PCI expansion bus, the high-end PCI-X bus and the AGP graphics card interface. Unlike previous PC expansion interfaces, rather than being a bus it is structured around point-to-point serial links called lanes. Each lane is capable of 250MB/S in each direction (PCIe 1.1) or 500MB/S in each direction (PCIe 2.0)

PCI-X An enhanced version of PCI version 2.2. It supports one PCI slot per bus when running at 133 MHz, two slots when running at 100 MHz and four slots when running at 66 MHz. It is intended to provide throughputs in excess of 1 GB/sec using a 64-bit wide 133 MHz implementation.

Physical Drive A single tangible drive is referred to as a physical drive.

Primary Storage Main memory i.e., RAM is frequently referred to as primary storage.

RAID Abbreviation of Redundant array of independent disks. It is a set of disk array architectures that provides fault-tolerance and improved performance.

RAID Type There are a number of RAID formats that are widely used. Some of the well-known uni-level types are RAID 0, RAID 1, RAID 3, RAID 5 and RAID 6. The prevalent complex types are RAID 10 and RAID 50. ,

RAID 0 RAID 0 utilizes simple striping, with the data being distributed across two or more disks. No data redundancy is provided. The figure below illustrates a purely hypothetical RAID 0 array comprised of three disks – disks A, B, and C – with four stripes – each uniquely colored – across those disks. Advantage: Striping can improve the I/O throughput by allowing concurrent I/O operations to be performed on multiple disks comprising the RAID 0 array. However, this RAID type does not provide any data redundancy.

RAID 1 An array that uses a single pair of disks. Both disks in the pair contain the same data It provides the best data protection but can't improve system performance. And storage space for the same data capacity should be double than in general cases. Hence storage cost doubles. The capacity of RAID 1 will be the size of the smaller HDD, so we suggest you connect HDDs of the same sizes to save HDD space. Advantage: RAID 1 ensures that if one

of the disks fails, its contents can be retrieved from the duplicate disk. Furthermore, a RAID 1 array can also improve the throughput of read operations by allowing separate reads to be performed concurrently on the two disks.

RAID 5 A RAID 5 array is similar to a RAID 4 array in that, it utilizes a striped set of three or more disks with parity of the strips (or chunks) comprising a stripe being assigned to the disks in the set in a round robin fashion. The figure below illustrates an example of a RAID 5 array comprised of three disks – disks A, B and C. For instance, the strip on disk C marked as P(1A,1B) contains the parity for the strips 1A and 1B. Similarly the strip on disk A marked as P(2B,2C) contains the parity for the strips 2B and 2C. Advantage: RAID 5 ensures that if one of the disks in the striped set fails, its contents can be extracted using the information on the remaining functioning disks. It has a distinct advantage over RAID 4 when writing since (unlike RAID 4 where the parity data is written to a single drive) the parity data is distributed across all drives. Also, a RAID 5 array can improve the throughput of read operations by allowing reads to be performed concurrently on multiple disks in the set.
RAID 10 A RAID 10 array is formed using a two-layer hierarchy of RAID types. At the lowest level of the hierarchy are a set of RAID 1 arrays i.e., mirrored sets. These RAID 1 arrays in turn are then striped to form a RAID 0 array at the upper level of the hierarchy. The collective result is a RAID 10 array. The figure below demonstrates a RAID 10 comprised of two RAID 1 arrays at the lower level of the hierarchy – arrays A and B. These two arrays in turn are striped using 4 stripes (comprised of the strips 1A, 1B, 2A, 2B etc.) to form a RAID 0 at the upper level of the hierarchy. The result is a RAID 10. Advantage: RAID 10 ensures that if one of the disks in any parity group fails, its contents can be extracted using the information on the remaining functioning disks in its parity group. Thus it offers better data redundancy than the simple RAID types such as RAID 1, 3, and 5. Also, a RAID 10 array can improve the throughput of read operations by allowing reads to be performed concurrently on multiple disks in the set.

Read Ahead Motivated by the principle of "spatial locality", many RAID controllers read blocks of data from secondary storage ahead of time, i.e., before an application actually requests those blocks. The number of data blocks that are read ahead of time is typically governed by some heuristic that observes the pattern of requests. The read-ahead technique is particularly efficient when the spatial distribution of an application's requests follows a sequential pattern.

RAID Rebuild When a RAID array enters into a degraded mode, it is advisable to rebuild the array and return it to its original configuration (in terms of the number and state of working disks) to ensure against operation in degraded mode

SATA Acronym for "Serial ATA". A hard disk drive interface standard developed to enhance connectivity and speed over the IDE, or Parallel ATA disk interface. Current generation SATAII supports speeds up to 300MB/S.

SCSI This is an acronym for "Small Computer System Interface". It is a high-speed parallel communication scheme permitting data transfer rates of up to 320 MB/sec using the Ultra320 specification. The current specification supports up to 15 devices per channel with domain validation and CRC error checking on all transferred data.

Secondary Storage Mass storage devices such as hard disks, magneto-optical disks, floppy disks and tapes are frequently referred to as secondary storage.

Secure Sockets Layer (SSL) is a cryptographic protocol which provide secure communications on the Internet. SSL provides endpoint authentication and communications privacy over the Internet using cryptography. In typical use, only the server is authenticated (i.e. its identity is ensured) while the client remains unauthenticated; mutual authentication requires public key infrastructure (or PKI) deployment to clients. The protocols allow client/server applications to communicate in a way designed to prevent eavesdropping, tampering, and message forgery. Secure Webdisk uses SSL. Also known as: Transport Layer Security (TLS)

Server Message Block (SMB) a network protocol mainly applied to share files, printers, serial ports, and miscellaneous communications between nodes on a network. It also provides an authenticated Inter-process communication mechanism. SMB and its successor, CIFS, are the native network protocol used by the Microsoft Windows family, and is also used by Apple MacOS X and is available for virtually every UNIX and Linux operating system.

Stripe A stripe is a logical space that spans across multiple hard disks with each constituent hard disk contributing equal strips (or chunks) of space to the stripe.

Stripe Set A stripe set is a set of stripes that spans across multiple hard disks. In the figure below, the displayed stripe set has 4 stripes, with strip number 1 comprised of the purple strips 1A, 1B and 1C. Stripe number 2 is comprised of the green strips 2A, 2B and 2C etc.

Stripe Size This is the size of the strips that constitute each stripe. This term is a misnomer – though prevalent – since it should appropriately be called strip size or chunk size.

TCP/IP (Transmission Control Protocol/Internet Protocol) A pair of communications protocols that implement the protocol stack on which the Internet and most commercial networks run. TCP is a peer-to-peer connection oriented protocol that guarantees the delivery of data packets in the correct sequence between two peers. IP is the protocol that defines and governs addressing, fragmentation, reassembly and time-to-live parameters for packets.

UPnP AV (UPnP Audio+Video) Networked Device Interoperability Guidelines, part of the UPnP standards supervised by the DLNA (Digital Living Network Alliance), a forum of vendors and manufacturers who work in the home entertainment industry.

Windows Internet Naming Service (WINS) is Microsoft's implementation of NetBIOS Name Server (NBNS) on Windows, a name server and service for NetBIOS computer names. Effectively, it is to NetBIOS names what DNS is to domain names - a central store for information, However the stores of information have always been automatically (e.g. at workstation boot) dynamically updated so that when a client needs to contact a computer on the network it can get its update normally DHCP allocated address. Networks normally have more than one WINS server and each WINS server should be in push pull replication,

the favoured replication model is the HUB and SPOKE, and thus the WINS design is not central but distributed, each WINS server holds a full copy of every other related WINS system records. There is no hierarchy in WINS (unlike DNS) but like DNS its database can be queried for the address to contact rather than broadcasting a request for which address to contact. The system therefore reduces broadcast traffic on the network, however replication traffic can add to WAN / LAN traffic.

Write-back Cache When a cache is operating in write-back mode, data written into the cache is not immediately written out to its destination in secondary storage unless the heuristics governing the flushing of dirty data demands otherwise. This methodology can improve the efficiency of write operations under favorable circumstances. However, its use can potentially lead to incoherencies in a system that is not protected from power fluctuations or failures.

Write-through Cache When a cache is operating in write-through mode, data written into the cache is also written to the destination secondary storage devices. Essentially write completion does not occur until the data is written to secondary storage. Thus the contents of the cache and the secondary storage are always consistent. The advantage is that the possibility of data corruption is greatly reduced. The disadvantage is that write-through operations are more time consuming

Appendix F: Product Specifications

System Architecture

CPU:	Ultra Low Voltage Intel® 1.5GHz Celeron® M Processor
System RAM:	512MB DDR
NVRAM:	On-board non volatile memory for firmware
Disk Interface:	5 channel SATA2-300 with NCQ drive controller
Network Interface:	Dual Gigabit Ethernet host controllers
Expansion Ports:	3x USB 2.0 Type A Ports for external disk and printer hosting 1x eSATA port for external disk hosting 1x USB 2.0 Type B target port
System Displays:	LCD Control Panel For basic configurations and status display 5 x LED (DOM, Network Activity x 2, USB Copy, System Busy) 5 x Disk status LED monitors
Disk Mechanisms:	5 hot swappable, 7200 RPM SATA2-300 NCQ enabled disk drives

Network Services

- Dual Channel Gigabit Ethernet with multiple subnet support
- Fixed/Dynamic IP Assignment
- 802.3ad based failover and link aggregation
- Platforms supported:
  - Windows 98/ME/NT/2000/XP
  - Apple OS X
  - UNIX/Linux/BSD
  - Any web enabled platform via ftp or webdisk
- Services Provided:
  - SMB/CIFS Common Internet File System
  - Apple File Protocol (AFP 3.1)
  - Network File System (NFS v3)
  - Microsoft NT Domain Controller (PDC) Integration
  - Microsoft Active Directory Authentication (AD) Integration
  - iSCSI Target supporting the following initiators:
    - Microsoft iSCSI Initiator v2.0.4
    - StarPort Initiator V3.5.2
    - MAC OS: globalSAN iSCSI initiator version 3.0 (1150)
    - Linux: open-iscsi 2.0-865
  - UPNP Universal Plug and Play for easy detection and configuration
  - Webdisk web storage support
  - FTP File Transfer Protocol
  - USB Storage Server
  - USB Print Server
  - Nsync Backup and Synchronization service
  - Disk Quotas per share

System Features

RAID level 0, 1, 5, 6, 10 and Span configurations
Multiple RAID and LUN support
Automatically and transparently rebuilds hot spare drives
Hot swappable disk drives
Disk S.M.A.R.T. status monitoring
Instant availability and background initialization
Disk Roaming
RAID Level Migration
Automatic drive insertion / removal detection and rebuilding
Field-upgradeable firmware in flash ROM
Firmware-embedded management via web browser-based RAID management
UPS monitoring via RS-232 and system shutdown on low battery
Wake-on-LAN and Scheduled Power On/Off
Fault Notification: Email notification
Buzzer notification
LCD

MaxNAS Dimensions:

Height	230 mm/9”
Width	190 mm/7.5”
Depth	230 mm/9”

Weight:

18 lbs with drives.

Power Consumption:

Normal operation: 1.0 AC Amps @ 115 Volts
Spin up (peak): 2.70 AC Amps @ 115 Volts

Power Requirements:

Internal Auto-sensing power supply (90-240vac) (47-62Hz)

Environmental Specifications:

Operating Temperature:	0ºC - 40ºC (32ºF - 104ºF)
Humidity:	20% - 85% RH (Non-condensing)
Certifications:	CE, FCC, BSMI, C-Tick, RoHS Compliant

Appendix G: Licence and Copyright

This product included copyrighted third-party software licensed under the terms of GNU General Public License. Please see THE GNU General Public License for extra terms and conditions of this license.

Source Code Availability

Micronet has exposed the full source code of the GPL licensed software. For more information on how you can obtain our source code, please visit http://www.micronet.com

Copyrights

- This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).
- This product includes software developed by Mark Murray.
- This product includes software developed by Eric Young (eay@cryptsoft.com).
- This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).
- This product includes PHP, freely available from (http://www.php.net/).
- This product includes software developed by the University of California, Berkeley and its contributors.
- This product includes software developed by Winning Strategies, Inc.
- This product includes software developed by the Apache Group for use in the Apache HTTP server project (http://www.apache.org/).
- This product includes software developed by Softweyr LLC, the University of California, Berkeley, and its contributors.
- This product includes software developed by Bodo Moeller.
- This product includes software developed by Greg Roelofs and contributors for the book, "PNG: The Definitive Guide," published by O'Reilly and Associates.
- This product includes software developed by the NetBSD Foundation, Inc. and its contributors.
- This product includes software developed by Yen Yen Lim and North Dakota State University.
- This product includes software developed by the Computer Systems Engineering Group at Lawrence Berkeley Laboratory.
- This product includes software developed by the Kungliga Tekniska Högskolan and its contributors.
- This product includes software developed by the Nick Simicich.
- This product includes software written by Tim Hudson (tjh@cryptsoft.com).
- This product includes software developed by Christopher G. Demetriou for the NetBSD Project.

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Version 2, June 1991

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